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[Founded in 1849 as the "Journal of Gas Lighting."]

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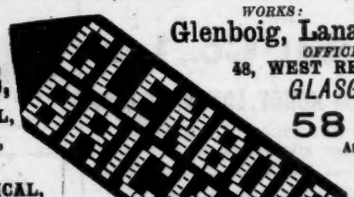

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FIG. 536.

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VOL CXLIX., No. 2958.] TUESDAY, JANUARY 20, 1920. [72ND YEAR.

EDITORIAL NOTES.

A New Principle in Settling Gas Workers' Wages.

THE award of the Industrial Court has been issued in the matter of the latest application for a 10s. a week increase, or 1s. 8d. per day or shift, for adult gas workers, and 5s. a week, or 10d. per day or shift, for juniors. In the official copy of the award, there is no mention of any increase for juniors; and so we assume that the Court is of opinion, as we are, that junior gas workers under eighteen years of age are already handsomely paid. The most important feature of the award is that the principle of discrimination as between the sizes in output of gas undertakings is for the first time recognized in making awards in respect of gas workers' wages, and the increase now allowed has been "stepped" accordingly. The datum-line is drawn at 100 million cubic feet; and in undertakings with annual outputs over this line, the workers above 18 years of age are to receive the further advance of 5s. a week, or 10d. per day or shift. Where the annual output of gas is below 100 million cubic feet, but above 50 millions, the increase is to be at the rate of 4s. a week, or 8d. per day or shift. In the case of undertakings with an output less than 50 million cubic feet, the advance is to be at the rate of 3s. a week, or 6d. per day or shift. The gas industry cannot afford these increases. All it can possibly do is to pass them on to the consumers, with the knowledge that the position of the industry is so much the worse. At the rate the price of gas has been ascending, consumers will scrupulously avoid using more gas than possible, and do all they can to effect economies, which, in turn, must affect the employment capacity of the industry. Anything that restricts consumption necessarily reacts on employment. The previous total of advances was 28s. 6d. a week for male workers, *plus* 12½ p.ct. on earnings for all male workers of 21 years of age and over. Seven shifts per week men receive more *pro ratâ*; while piece workers enjoy corresponding advances, but *plus* 7½ p.ct. instead of 12½ p.ct. A reduction of hours was also made last year; and several other changes have been effected, which in some cases will make the increase of wages over pre-war rates considerably in excess of 28s. 6d., *plus* 12½ p.ct. With the present award, the increase over pre-war wages will for the time workers, according to the grade in output of the undertaking, be 33s. 6d., 32s. 6d., or 31s. 6d., *plus* the 12½ p.ct. But the increase of 5s., 4s., or 3s., as the case may be, is not the total advantage, because all increases are taken into account in calculating overtime, night work, and payment for work on Sundays and holidays.

So much for the fresh increase that has been made. We are not going to argue the question as to whether or not there is good justification for making this further advance. The decision of the Industrial Court has to be taken to mean that there is good ground. We shall be glad when the Industrial Court is able to say that claims for additional payments cannot be substantiated. Of pronounced interest is the feature of the award which introduces the new principle of grading gas-works according to output, and of diminishing the addition to the wages within the specified limits. We are not altogether sure that this new principle —correct as it might have been formerly—will now be to the ultimate benefit of the gas industry as a whole. The representatives of the men objected to it on the ground that previous negotiations were conducted on a national basis, and no discrimination had been made as between works. There is much to be said for discrimination or grading; and there is just as much that is of weight against it—at this time of day. There is complete agreement with the argument that, generally speaking (it does not apply universally), the small statutorily controlled gas undertakings have been hit the hardest during the war and the succeeding time, because situation and resisting power are not so good as in the case of the larger concerns. We also agree that the living expenses of the workers in country districts are not so great as are those of the workers residing in the cities and big towns. There is ample argument in favour of special consideration for small undertakings, if the further rise is justified. But all the smaller concerns are not in dire straits; and the Industrial Court has made provision which will give the representatives of the workers the right to appeal in special circumstances for the advance to be raised to the level of that applying to the larger undertakings. This appeal, if made, it is suggested, should be first to the Joint Industrial Council for the industry, and, failing settlement by that body, to the Industrial Court.

However, the Court, finding the case proved for special consideration being given to the small undertakings, saw no other way of applying differential advances than by discriminating on output, though the only safe way would have been (had it not been too gigantic a task) by individual inquiry. The point having been gained, it may well be asked whether it was wise to raise it now at what we hope is the end, or practically the end, of these advances. Of course, no one can say positively what is likely to happen in the future; but one has a right to hope that the 28s. 6d., in combination with the present advance, *plus* the 12½ or 7½ p.ct. as the case may be, represents the bulk of the increases that will be made. If so, the submission that the new principle should be applied has been made late in the day. As the decision of the Industrial Court confirms the contention that the principle of differentiation should be applied, then it follows that the small undertakings should have had the advantage of it right away from the beginning, and not only now when—the number of men for each undertaking being relatively small—the difference of 2s. (compared with the largest undertakings) per man per week cannot amount to much in the aggregate for each concern. We estimate that about 30 p.ct. of the statutory gas undertakings will have to pay the 5s. increase, 18 p.ct. the 4s., and 52 p.ct. the 3s. But in man power and output, the 30 p.ct. floods the 70 p.ct. completely. What we fear is that the introduction at this late hour of the principle of differentiation supplies a new fighting point, which will in the future provoke a good deal of argument and contention. It may be anticipated that, if there is any further application for an increase, the Workers' Federation will make the steps of their demands pretty steep as between the three categories of undertakings, in order to attempt to secure more for the employees of the small concerns. When, too, the time comes for a consideration of the position with the view of reducing the amount of the war-time wages to a sum consistent with a lower cost of living, the Workers' Federation may urge that the principle should still be recognized. We are not at all sure that the principle will have any enduring advantage for the small concerns, though the argument for it was made with the best of intentions.

It is hoped that what is said here will not be construed as indicating any want of sympathy on our part with the smaller undertakings. Had the new principle been sought and applied earlier, well and good. But was it politic to ask for it now? And has the gain (if so it can now be called) any value of sufficient consideration to warrant a welcome being given to its introduction? We have our doubts,

The Changing Aspects of Gas Legislation.

THOSE who have kept close touch with the gas industry's parliamentary affairs over a number of years will have noticed how gradual has been the evolution to the present Government approved position in regard to the heat-unit valuation of gas, and the proposed charging for it on that basis, accompanied by limitation of inerts. But the evolution has always been over a course on which obstacles have been set-up by the obscurantism of local authorities who in other matters claim to be the most progressive people in the world, and by the legislative adherents to precedent, whose strongest propensity formerly appeared to be towards the art of stereotyping, instead of change conforming with the times and advancing knowledge. We had 16 to 20 candle power gas. It was a most difficult thing to get it brought down to 14-candle power, when the major part of the gas distributed was being applied to purposes in which heat was the primary requirement, and not luminosity of the gas *per se*. Then at last—eight years or so ago—Parliament was induced, in face of much opposition, to grant a calorific power standard. This was at first put at 540 B.Th.U., with the penalty line at 7½ p.ct. below—say, at 500 B.Th.U. After a time, there was agreement that 500 B.Th.U. would make a nice level figure for a standard; but from this, except in a few isolated instances, the Private Bill Authorities would not budge, nor would they consider the influence of local conditions as justifying, in the slightest, any variation.

They were so obsessed by loyalty to precedent, that they refused to be persuaded by differences in coal quality and the scientific fact that, within certain limits, it matters little to the consumer from the heating point of view what is the calorific value of the gas, inasmuch as at the point of combustion there is an approximate parity in B.Th.U. per volume of gas-air mixture. But "D.O.R.A." took no account of precedents. She, fortunately for the gas industry, only consulted her own conveniences, and the national interests. So there has been an experience with lower calorific power gas, which has resulted in considerable coal economy, and has proved the losses that ignorance of facts and obstinacy have imposed for many years on the country, the industry, and its patrons. Then came the reference by the Board of Trade to the Fuel Research Board in connection with the question of gas quality and inerts. The report which the Board issued, in effect, strongly condemned past legislative enactment, which had stereotyped operation, and so curbed economy and efficiency. The condemnation was indirectly expressed by the recommendations as to basing the operations of the gas industry—both productive and trading—on a heat-unit basis, with freedom to declare by individual undertakings a calorific standard under the conditions that would promote the utmost economy and efficiency. Such recommendations could not be ignored; and in the coming session it is hoped, after the struggling of past years, that the goal will be reached.

There will be (there is the promise of the Board of Trade) the Government Bill. But anticipating this, the Gas Bills which we have been reviewing in the last two issues of the "JOURNAL" and the present one supply us with precursors. These are the promotions of the South Metropolitan and the South Suburban Gas Companies, which have already been commented upon in previous issues. But they (as it were) herald the most puissant change that has ever come over the gas industry; and other concerns—notably the Wandsworth, the Brighton, Rochester, and Southend—are providing for the adoption of the proposals of the Government Bill when enrolled in the Statute Book. The promoters who have not included this general power in their Bills should, we think, amend them in this particular. There is a fair amount of safety in saying that this year will mark a new era in the annals of the gas industry; and after this the industry ought to be relieved from much of the hostility that has in the past been shown to its progressive plans. If this were the only change with which the industry was faced, all would be well. But times have altered, and with them economic conditions.

The financial terms on which the industry operates at the present time have to be improved; for gas undertakings have had their financial stability roughly shaken by their statutory enactments being inconsistent with the mutations of the past few years. Not only has there to be re-establishment of credit, but a recurrence of what has happened has to be guarded against. We have this reflected in the proposals of the Bills for more liberty in regard to dividends and interest, for more freedom in the matter of loan capital, for higher standard and maximum prices, for larger powers in regard to capital, and for higher charges for prepayment gas meters, fittings, and cookers. With the higher costs of materials and labour, the old standards of capital allowance can no longer apply; and, compared with pre-war times, estimates must be at least doubled, with provision on the same scale for increases of business. It is a pity there is still obscurity as to what the Government will be proposing as to new financial terms for the industry, because there is a large amount of work waiting to be carried out in the industry which would give extensive employment; but there is a natural reluctance to enter upon it to anything like the full extent until those responsible for the administration of gas undertakings have knowledge as to what will be the new financial terms. As things stand in respect of existing capital, there is difficulty in attracting fresh capital to gas undertakings. Investors seek for the evidence of security not among vague promises, but patent and tangible facts.

Nevertheless, there are Bills proposing new works and an extension of limits of supply, so as to enlarge the area of business; and fresh capital powers in accord with the new level of costs are desired. Compared with pre-war times, at least double the money has now to be spent per unit of new business. With regard to standard prices, the South Metropolitan and South Suburban Companies are respectively proposing 11d. and 1s. 2d. per gas unit (100,000 B.Th.U.); but the Brighton and Hove Company are asking for their standard price to be raised to 4s. 9d., the Southend Company to 5s. 6d. and 5s. 9d. (for their different issues of capital), while the Rugby Company are in their circumstances content with 3s. 8d. The promoting local authorities, on the other hand, are proposing these maximum prices: Redcar, 5s.; Pontypridd, 5s. 6d.; Halifax, 6s.; Masham, 6s.; Tredegar, 6s. 6d.; Risca, 7s.; and Newtownards, 8s. 4d. A favourite change in the rentals for prepayment meters and fittings is to 1s. 3d., with cooker 1s. 6d.; and 6d. or 8d. for meter only. Provision is generally made for the alternative charge of 10 p.ct. on cost; and in one case 15 p.ct. is mentioned. The right is desired to charge either the fixed rate or the percentage, whichever is the higher. This is a result of the new costs of repair, maintenance, and renewal; and the higher costs of collection and supervision.

Reverting for a moment to the question of calorific power, it is noticed that three of the promotions—Coventry, South Suburban, and Southend—are proposing standards of 450 B.Th.U., and Masham and Redcar 500 B.Th.U. Of course, if the proposed general legislation is successful in the approaching session, these standards could be adopted by the undertakings concerned as their declared calorific values. But the chances are there will be a disposition on the part of the Private Bill Authorities to see the issue of the General Bill; and act accordingly in respect of proposals as to definitely prescribed standards. Among other miscellaneous matters, promoters are proposing authorization to supply power gas and to purchase coke-oven gas, which is very much in harmony with the view of the Fuel Research Board, that the gas industry should do more than it has done in the past to make its works the centre from which gaseous fuel is drawn for all purposes, and so contribute as much as practicable to the general economy in relation to coal supplies. All along the Great Northern Railway line, the gas undertakings will be considering the action they will take over the proposal of the Company to purchase gas where they please, and to pipe it for use to any part of their system. This is a matter to which we drew special attention on Jan. 6 [p. 18]. An interesting feature of projected legislation for the session has gone by the dropping of the gas-works purchase proposals of the Sheffield and Sunderland Corporations. The Masham and Redcar District Councils, however, are still out to become possessed of the local gas undertakings; and the Southend Company are purchasing the privately owned gas-works at Rochford.

These, however, are small matters compared with the heat-unit and financial revision schemes, which will jointly give to the industry the powers to enable it to rehabilitate its affairs, to broaden out in service, and at the same time do a good part (as the Coal Controller's Department can testify) in economizing coal, and making it productive to the maximum degree.

Official Values.

THE value of the services of officials in the gas industry is still in some quarters receiving very low estimate. A correspondent pointed this out in last week's issue; and he pilloried the Hyde Gas Company for to-day offering a salary of £350 for an Engineer and Manager for their works, with an output of 219 million cubic feet per annum. If the salary is compared with output, with the current economic conditions, or with the wages that are being paid to men who merely carry out instructions, and have little or no responsibility or call upon their intellect, it shows that the Directors of the Company are sadly behind the times in their appreciation of what is equitable. They have overlooked or ignored the fact that, as administrators of a business concern, it is their duty, in the payment of salaries as well as of wages, to have regard to new standards and new conditions. The salary they offer for a man of broad technical and commercial knowledge, for one who has to take the responsibility of not allowing anything to slip past him that will help to maintain the interests of the concern under conditions of unprecedented severity, and for one whose brains must constantly be alert, works out to £6 14s. 7d. per week, or to 0·38d. per 1000 c.ft. of annual output. This is an estimate of official value which we much regret to see in the gas industry. Foremen and others are receiving as much as this; and men below them are getting as much as two-thirds, and, in some classes of work, more than two-thirds of the salary suggested in the Hyde instance.

This valuation of official service will not do. Notions as to pay for brains and responsibility must be on an adequate scale, consistent with the new times and higher responsibilities. The margin between the salary of the man who uses his brains and carries the responsibility and of the wages of men who simply carry out instructions must be such as to ensure the maintenance of good intellectual capacity and a high standard of responsibility, as well as to make the gas profession attractive to competent men. We have seen more than once lately men who have been associated with the gas industry in good positions drifting away from it to other industries that have offered greater reward for their services. This must not continue. But it will continue if inconsideration and parsimony persist in the treatment of officials. There are plums in the gas profession. The holders of these have no cause to complain. The professional men in offices below the highly placed ones supply the ranks in which are to be found with too great frequency those who have not received the same consideration as the workmen whose services they direct. The effect of this will, if not stayed, be very far-reaching. All our advance is due to intellect; and if intellect is not to receive the superior reward, it is certain we shall soon find, with the narrowing of the difference of pay, that men competent to manage and to plan will be content to shed responsibility, work shorter hours, and receive the excellent pay of the workmen, as well as their privileges. Everything is being standardized for the workman to-day; he knows exactly where he is. This is not the case with many officials. Their minds are constantly occupied; and the calls upon their personal attention to business have no time-limits. Theirs is the responsibility. It is for this they are appointed; it is not for this that all are sufficiently paid. We admit that workers are entitled to all they can earn, but not all that can be obtained by forcible methods, or at the hands of unjudicial arbitrators. But unfortunately though labour is only made possible by the fruits of brains, labour is not always prepared to mete-out to others that justice which it claims for itself; and more regrettable still is the preference of some gas administrators to live in the past so far as official salaries are concerned. Their assessments of the due of official service must undergo revision.

To Develop Production of Nitrogenous Fertilizers.

THE long-awaited report of the Nitrogen Products Committee has now been issued; and it is found that the delay in its publication is excusable, in view of the magnitude of the volume, and the ground covered by the investigation. Whether more genuine profit attaches to all that has been printed than would have been derived from something put in more concise form, we cannot at present say, as time has not permitted an adequate investigation of the contents for the purpose of forming judgment. There is no question the Committee have been most painstaking in their inquiry; and if in all respects they have not been able to obtain the proof of actual working test, this has not been due to the want of effort, but rather to the close of the war, and the apparent disinclination of the Government to spend more money in proceeding with plant construction and research dealing with a matter inspired more by war than by peace. This question of nitrogenous products is, however, as much one for peace as for war. At the same time, there appears to be a tendency in the report to allow enthusiasm to outrun discretion; and for vision to leave largely ignored practical consideration. Much of the recommendation is based on speculation as to prospective demands; and we think that business men who know the markets of the world, and what the world is doing in the provision of nitrogenous fertilizers, will be inclined to suggest that this is a matter in which we should go warily. In laying plans our probable home requirements have to be taken into account with our prospects in regard to export; and the means of making an approximate estimate have yet to be developed, seeing that the past five years have completely shattered the conditions on which before the war assessments could be based. There is no part of our industrial activities that is now shrouded in more uncertainty than this one of the probable demand for output and competition in nitrogenous fertilizers.

This country, of course, must not be behind other countries in cheap production, and a sufficiency. It is true that the home demand for such fertilizers far exceeds to-day what it was before the war, and that sulphate of ammonia has had an annual consumption previously unapproached. This has been due to intensified action induced by the war; and change due to the same cause has been proceeding elsewhere. It needs no argument to show that the situation of the country would be much improved if it made itself independent of the importation of such products; and this is the strongest ground on which some of the recommendations in the report can be justified. The Committee urge that the sources of supply of combined nitrogen in the United Kingdom must be considerably increased if the existing and prospective demands are to be met, and the pre-war scale of exportation is to be maintained. There we have at once two out of three factors that are "*x*" quantities. What is likely to be the prospective home demand in excess of the existing? And will the pre-war scale of exportation be recovered for some time to come, and then be maintained, in view of production developments in other parts of the world? The Committee apparently think the home demand will be a huge growth from the existing, and that the scale of exportation will be comparable with pre-war days, and will extend. Many other people who have intimate knowledge of world markets and the trend of world production are inclined to suspend definite judgment. The Committee propose that the cyanamide process should be adopted in this country, and that the initial plant (there is a suggestion as to Government support) should have a capacity of at least 60,000 tons per annum. It is stated that combined nitrogen as cyanamide or sulphate of ammonia can be obtained by the synthetic process at a cost at the factory less than half the market price of combined nitrogen from other sources—pre-war conditions being taken as the basis in each case. It is also proposed that the synthetic ammonia (Haber) process should be established in this country as a *post*-war measure—the minimum manufacturing scale being 10,000 tons of ammonia, which would be equal to 40,000 tons of sulphate of ammonia. It is calculated that the total factory cost is about £29 per metric ton of fixed nitrogen, which is equivalent to about £6 per metric ton of sulphate of ammonia. Compare this with the pre-war costs of sulphate! These two proposals alone would by way of a start add 100,000 tons of fertilizers to the present output.

Upon this, the Committee urge that all encouragement should be given to the efforts to extend the use of coal gas and coke in place of raw coal for domestic purposes, for steam raising, and other industrial requirements. There is agreement with this; and incidentally this would increase the ammonia producing capacity of the gas industry. Encouragement, the Committee suggest, should also be given to the displacing of non-recovery coking ovens by recovery ones. It should be made incumbent upon all gas-works to prevent losses of ammonia by volatilization or otherwise. Standards of efficiency based upon the qualities of coal (we would point out that the method of carbonization would also have part) are likewise suggested, with powers, if necessary, conferred upon the Ministry of Health to ensure observance, where it could be shown that no financial loss would be incurred. This is a recommendation which would meet with

some opposition in an industry already saddled with a vast amount of statutory obligation; and it can easily be imagined that conditions might arise, if the whole of the recommendations of the Committee were adopted, in which it would not pay gas undertakings to seek to recover and bring to book the last fraction of ammonia. In their own interests, so long as there is a commercial profit on the transaction, gas undertakings will, without the application of any compulsion from the outside, look to efficiency to help them under their heavier financial burdens. We do not see in the recommendations any reference to gas undertakings in industrial centres being made the sources of the supply of producer gas from coke, in which resides a good proportion of the nitrogen originally contained in the coal. However, the Committee propose a big scheme of research, and this subject might have a place in it.

Whatever may be the issues of the report, very careful observation should be maintained in the interests of the coal-carbonizing industries to see that anything that is done is not productive of detriment to them to an extent that is not more than counterbalanced by the advantage gained in other directions. No one can seriously oppose progress; but in these matters real progress should always show a balance of national advantage.

Calculating the First Allowance.

Some interesting correspondence on this subject will be found among the letters published in this issue.

National Association of Technical Gas Officials.

The question was asked in last week's issue, "Where is the National Association of Technical Gas Officials?" The answer will be found in our "Correspondence" columns to-day.

A One-Direction Sliding-Scale for Electricity Companies.

There is evidently reluctance just now in the gas industry to discuss the question raised in our editorial columns on the 6th inst.—"Has the Sliding-Scale had its Day?" Mr. R. W. Edwards, who believes as firmly as ever in the principles of the old sliding-scale, with revision, had in our columns last week a letter on the subject; and it will have been seen he is inclined to the view that simple revision will be the wisest plan, without the introduction of a new scheme as proposed in the South Metropolitan Gas Company's Bill, or of revision of the adjustment now made after a term of years as suggested by the South Suburban Bill. He emphasizes a point previously made in the "JOURNAL," that the sooner the Government can divulge its proposals for redress of the financial terms on which the industry works, the better it will be for gas undertakings. There is a large amount of work hung-up in the industry that should be carried out as early as possible in the public interests. In connection with this question of financial revision, it will be seen from our "Electric Supply Memoranda" to-day that an important group of electric supply companies have a Bill in Parliament which proposes to adopt a maximum price of 1s. 2d. per unit, a standard price of 1s., a dividend of 6 p.ct. at that price, and an accretion of dividend of ½ p.ct. for every ¼d. reduction below the standard price. Nothing is said as to a diminution of dividend if the price goes above the 1s. With the exception of the fixed variation of dividend at charges below the basic or standard price, there is somewhat of a similarity between the electrical scheme and that of the South Metropolitan Company. The proposal is quite an innovation in the electricity supply industry. A dividend of 6 p.ct. seems to be generally regarded as the correct new standard.

The Railway Settlement.

There seems to be a chance now of the country being able to settle-down without the cloud of uncertainty upon it arising out of difficulties connected with the railwaymen; and the Ministry of Transport and the Government will be free of a difficulty that has been standing at their sides and continuously harassing them for some considerable period. The whole of the people of the country, and particularly those responsible for its industries and trading, will be glad that there is at length agreement, and that, if anything fresh arises, it will now be dealt with by the new machinery that has been established in connection with the Ministry of Transport, in which machinery the railwaymen have an important place. It was only last Friday week that the branch delegates of the railwaymen rejected the agreement on the wage standardization question which the Government and the Executive of the National Union of Railwaymen had arrived at after a very patient investigation extending over as many months as it took days for the delegates to refuse the result, which did not square with the maximum demands of the men. The firmness of the Government in declining to depart from the principles upon which the agreement was framed, and which were exceptionally generous (though the Government agreed to iron-out anomalies, and to make certain extensions in respect of detail), put upon the delegates the onus of deciding whether an attempt should be made to force the claims, or the terms be accepted. Advising prudence were the memories of the last railway strike; and, with terms so liberal on offer, the delegates no doubt saw public opinion and resentment again rising up against the railwaymen. And a second defeat was something not to be lightly entertained. So by a small majority the better course was taken; and trade unionists generally are glad, because they saw the principle of collective bargaining—through the prior decision of the railwaymen's delegates, and through what happened in connection with the moulders' strike—receding from them.

Standardization of Wages.

There are points about this settlement with the railwaymen which may have considerable influence throughout the labour world. There is the principle of standardization at 100 p.ct. above the average of the pre-war rates in any grade of railway workers, with a sliding-scale in respect of the cost of living operating on payments above the standardized level. A majority of the delegates, it will be remembered, objected to standardization being on the "average" of the pre-war rates; and they wanted the maximum, which would have meant an additional heavy burden of several million pounds upon the country. Likewise they did not desire the sliding-scale brought into operation. There was a disposition all through to refuse to recognize that wages have not risen to the present heights by any normal movement of economic conditions. However, the matter so far as the railwaymen are concerned has been settled. The question is what is going to be the effect in other industries of this adoption in the case of the railwaymen of the principle of the standardization of the wages at 100 p.ct. above the pre-war level?

The Coal Shortage.

There has been a great outcry in the daily papers as to the shortage of coal in the country; and there have been attempts in some quarters to belittle this. An outcry of the kind is not the product of fancy; nor would industrial works close-down on account of the absence of fuel when there is plenty. Many gas-works managers are fully conscious of the deficiency in supplies; and not a few look with lugubrious feelings at the dwindling of their small but much cherished stocks. The matter is one of considerable gravity; and the minutes of the Central Board of the National Gas Council inform us that an opportunity was to be given to discuss the matter personally with the Coal Controller. Transport is still being made the scapegoat for the shortage; but actually there is no doubt, although just before Christmas output was up in the neighbourhood of 4,800,000 tons (the week ending Dec. 20 reached 4,910,000 tons), we are suffering from prior events—strikes and low output, which have caused the country to live from hand to mouth in respect of coal; and now the accumulated higher demands of winter are upon us, with little in hand. The holiday weeks had a disastrous effect upon supplies. During the week ending Dec. 27, only 3,352,603 tons were raised; and the succeeding week (ending Jan. 3) the production was merely 3,494,603 tons—a drop of nearly 3 million tons in a fortnight. There is always a falling-off of output at Christmas and the New Year; but such a decline (with supplies and stocks as they are) is anything but pleasant. However, it is hoped a return to the rate of output preceding Christmas will be an immediate experience.

Annual Coal Output and Disposal.

The output of coal last year was in round figures 230 million tons—an improvement of 3½ million tons upon 1918, and a reduction of 18 million tons upon 1917. Looking back to the pre-war

year of 1913, the output of coal was then 287,411,869 tons. Thus last year, though more men were in the mines, there was a difference to the bad of between 57 and 58 million tons in the quantity raised compared with 1913. Last year's output suffered severely from strikes—the accumulated losses (including both coal and railway strikes) being variously estimated at from 6 to 8 million tons. It is seen from the "Iron and Coal Trades Review" that the inland consumption of coal during the past three years has been approximately: 1917, 200,012,343 tons; 1918, 183,626,609 tons; and 1919, 179,513,165 tons. There were used for bunkers in the same period: 1917, 10,227,952 tons; 1918, 8,756,476 tons; 1919, 12,021,242 tons. The exports of coal, coke, and patent fuel were: 1917, 37,800,705 tons; 1918, 34,173,915 tons; and 1919, 38,465,593 tons. From the official returns, it is seen that the last-named figure is made up of 35,249,568 tons of coal; 1,508,010 tons of coke; and 1,708,015 tons of patent fuel. Of the coal exported last year, 3,342,019 tons are classified as gas coal.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

AT a meeting of the Central Executive Board of the National Gas Council, held last Tuesday, at 30, Grosvenor Gardens, S.W., Mr. D. Milne Watson was re-elected Chairman for the ensuing year, and Mr. Alderman Phillips as Vice-Chairman.

Mr. D. Milne Watson stated that immediately upon the issue of the Coal Controller's "Instruction" to gas undertakings with reference to the rebate on domestic coal, a meeting was held of the Emergency Committee of the Council; and the conclusion was finally come to that the method since adopted by the Coal Mines Department for dealing with this rebate was the least objectionable of any that might be suggested, inasmuch as it would disarm criticism of the gas industry, who would hand back to domestic consumers the rebate which they received on the coal.

Reference was made to the price of coke, and several protests were lodged against the action of the Coal Controller in refusing to allow the rebate to be divided between coke and gas—thereby depriving gas undertakings of their markets for coke.

It was suggested that the Government be asked to make some authoritative declaration to the effect that, in carrying out the order of the Coal Controller, gas undertakings were merely acting as agents for the Coal Mines Department, and were themselves powerless in the matter.

It was reported that the Coal Controller was anxious that the Council should send a deputation to meet the heads of the various Coal Committees as last Friday (the 16th inst.), when the Coal Mines Department would discuss the question of coal stocks.

The deplorable increase in the price of gas oil was referred to, due mainly, it was stated, to the dearth of tankers for the transport of this commodity.

A resolution was read from the Southern District Executive Board of the Council, calling for an "immediate and definite reply to their letters addressed to the Prime Minister on the question of a reduction in the rates of seaborne freights, and failing a favourable reply, steps should be taken through the press to acquaint the public of the situation."

A resolution from the South-Western District Committee of the Council was read, on the subject of the financial hardships of the gas industry; and the Chairman reported that he was authorized to state that the Board of Trade were proceeding with the drafting of the Government Bill, which the industry was anxiously awaiting.

Reference was made to the recent increases in the prices of stoves and meters; and the advisability of standardizing patterns of cookers and heaters was earnestly discussed.

Conversion of Explosives into Fertilizers.—According to "La Nature," as quoted by the "Technical Review," acting under orders from the Italian Government, experiments have been carried out by Sig. F. Garelli, of Turin, with a view to the conversion of surplus explosives into nitrate fertilizers. In separating the nitrate of ammonia from the explosive mixture, advantage has been taken of the great solubility of the former in water. A fixed percentage of water was added to the explosive mixture, and then allowed to stand in special receptacles. A dense solution of nitrate of ammonia was thus obtained, which was separated by decantation. A quantity of powdered peat was then mixed with the solution, which, after drying, takes the form of a fertilizing material that has been called by Sig. Garelli "nitric peat." It has the following composition: Water, 17·8 p.ct.; ash, 18·8 p.ct.; nitrate of ammonia, 42·8 p.ct.; organic matter, 20·6 p.ct. The product has the appearance of a blackish powder, and contains 16·4 p.ct. of nitrogen, together with 0·06 p.ct. of phosphorus anhydride and 1·8 p.ct. of potash. Its composition closely resembles that of nitrate of soda; and the material would prove an efficient substitute for the latter, as has been confirmed by certain practical tests carried out in the Alba district, Italy.

GAS BILLS FOR 1920.

[Third Article.]

IN this third article reviewing the Gas Bills, we have the two most interesting private gas promotions of the session—the Bills of the South Metropolitan and South Suburban Gas Companies. But seeing that we have already reproduced *in extenso* the clauses of the Bills dealing with the heat-unit basis of charging and the revision of the sliding-scale clauses [see "JOURNAL" for Dec. 23, pp. 661-3], the summarizing of the Bills will be a light task. An editorial comment on the two measures appeared in the "JOURNAL" on the same date; and a fortnight ago an article was published [p. 16] which asked "Has the Sliding-Scale had its Day?"

In the preamble of the Bill of the SOUTH METROPOLITAN GAS COMPANY, it is stated that the undertaking is a large industrial one supplying a public service to an important Metropolitan area, containing upwards of one-and-a-half million inhabitants, and more than 8000 persons are engaged in the undertaking. By the Company's Acts, the dividend on the ordinary stock is dependent, under a sliding-scale, on the price at which gas is from time to time sold; and the dividend under the sliding-scale for the ten half years up to June 30, 1914, was at the rate of £5 9s. 4d. p.ct. per annum. Owing to the existing circumstances, the proper conduct and development of the undertaking on the conditions which now apply thereto has become impossible. The Company are therefore desirous that new provisions should be made with a view of securing that the public, and those employed in the undertaking, and those providing capital therefor, should be—and that more than heretofore—directly and mutually interested in and advantaged by the development and improvement of the undertaking and the earnings thereof, and the cheapening of the price of gas. The Company are therefore desirous that, with a view to securing these objects, provision should be made whereby the profits of the undertaking, after providing for a reasonable return on capital, should be applied as to the greater part to the reduction in the price of gas, and as to the balance in part in increasing returns on capital invested in the undertaking, and in other part by way of bonus to the employee co-partners. It is further submitted that the provisions applying to the sale and supply of gas are not the best in the interests of the consumers, who, under the conditions now prevailing, are required to pay on the basis of the volume of gas they consume without due regard being had to the heating value of the gas. Therefore it is expedient that new provisions should be made as to the basis and method on and by which gas shall be supplied by the Company, and the charges for the same shall be calculated and arrived at, and as to the application of profits. The first clauses of the Bill are those dealing with the heat-unit basis for gas supply, and then succeed those proposing new lines of regulation for the price of gas and dividends. As mentioned above, these were all published in the "JOURNAL" for Dec. 23 last. The succeeding clauses revise the reserve fund powers, and provide for a special purposes fund by the appropriation out of revenue of an amount not exceeding 1 p.ct. of the paid-up capital, and the maximum amount of which is not at any time to exceed one-tenth of the paid-up capital, including premiums. The next clauses deal with occasional vacancies on the Board, and provide that no person shall be disqualified from being a Director by reason of his holding any office or place of trust or profit under the Company, or by reason of his being interested in any contract with the Company. Authority is asked to supply gas in bulk, and to purchase lands up to 50 acres. Annual meetings either in February or March are arranged for. Power is included to grant pensions and retiring or superannuation allowances by direct grant or by contribution to existing superannuation funds; and authority is to be taken to make donations, subscriptions, &c., to hospitals, convalescent homes, or to accident and sick funds. Finally, it is proposed that the provisions of section 64 of the Act of 1876 shall be read and construed as if they empowered the Company, but subject to the provisions of the section, to amalgamate their undertaking with, or to purchase any undertaking for the supply of gas in any limits of supply which adjoin or are contiguous to those of the Company. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The preamble of the Bill of the SOUTH SUBURBAN GAS COMPANY states that the issued capital now consists of £1,087,795 of ordinary stock, which is subject to a sliding-scale of price and dividend, having a standard rate of dividend of 5 p.ct. At June 30, 1914, the price of gas in the inner area was 2s. 3d. per 1000 c.ft.; the dividend payable at that price under the sliding-scale being at the rate of 6 p.ct. per annum. At the end of last December, the price was 5s. 2d. in the inner area, at which charge the authorized rate of dividend on the ordinary stock under the sliding-scale would be 3s. 4d. p.ct. per annum. Under the Statutory Undertakings (Temporary Increase of Charges) Act, the rate of dividend is 3¾ p.ct. per annum. It is also mentioned that, in respect of a considerable part of the Company's area, the Act of 1912 provides that the gas shall have a value of 540 B.Th.U. gross, but that the Company shall not be liable to penalties for a deficiency in quality unless ihe calorific value is less than 475 B.Th.U. gross. In the remainder of their district, the Company are required to conform to an illuminating power standard of 14 candles With the assent of the Board of Trade, however, the calorific value of the gas supplied last half year was 450 B.Th.U. gross

The Company now propose that the heat-unit basis of charging shall be applied, and that a standard of calorific value shall be extended to those parts of the area of supply now under the illuminating power standard. New provision is also sought to relieve the Company from the financial hardships from which they are suffering owing to the terms of the sliding-scale being inconsistent with the new conditions. In the first schedule to the Bill, certain lands at Erith are specified, on which the Company ask for power to erect, maintain, improve, and renew works, and to do all such acts as may be necessary for the making, storing, and supplying of gas, and the working-up and conversion of the secondary products arising directly or indirectly from the manufacture of gas by them. The section is only to apply to such of the lands as shall for the time being have been acquired by the Company. It is further proposed that the purchase of such of the lands described in the first schedule as has already been acquired by the Company shall not be taken into account when ascertaining the quantity of land which they are empowered to purchase and take by agreement, and to hold for the purposes of the undertaking. Power is sought to the raising of additional capital to the amount of £500,000, with one-third borrowing powers. Debenture stock authorization follows. The rest of the Bill dealing with the alteration of the basis of charge and of the terms of the sliding-scale was reproduced in its entirety in the "JOURNAL" for Dec. 23. [*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

The SOUTHEND GAS COMPANY are proposing to extend their limits of supply, increase their standard price, and alter other of their financial provisions. From the preamble of the Bill, it is seen that the present calorific standard is 540 B.Th.U. The standard dividend is 5 p.ct. per annum, subject to the sliding-scale operating from a standard price of 4s. per 1000 c.ft. in respect of the capital raised under the Acts of 1904 and 1914; but for capital other than under these Acts, the standard price is 4s. 3d. The capital and loan positions are set out. Turning to the clauses, it is proposed that the limits of supply shall be extended so as to include the parish of Rochford, and parts of the parishes of Eastwood, Hawkwell, and Little Stambridge. The Company also desire powers to purchase the Rochford (Essex) Gas-Works, under an agreement made between them and Henry Samuel While and Frederick Herbert While. The purchase price is to be £8000, and £800 for other property. Specification is also made of other goods which will be taken over on agreed terms. As to the capital and borrowing powers, there is first a provision repealing the limits of dividend on the preference capital raised under the Acts of 1904 and 1914; and it is proposed that the dividend shall hereafter be at such rate as the Directors may determine at the time of creation. It is desired that the borrowing powers shall be increased to one-half the amount of the capital raised. Redeemable preference and debenture stock powers are included. There is a clause repealing sub-section 1 of section 16 of the Act of 1914, which refers to a capital redemption fund; and sub-section 2 of section 16 it is provided shall hereafter be read and construed as if the Directors were authorized to appropriate out of revenue, and to transfer to the capital redemption fund established under the section, any sum not exceeding in any one year £6000, and not exceeding in the aggregate £60,000. A standard rate of dividend of 7 p.ct. is proposed, and 5s. 9d. is the suggested new standard price, provided always that, in the application of the provision of the sliding-scale to any capital authorized by the Acts of 1904 and 1914, the provisions shall have effect as if 5s. 6d. were substituted in the section for 5s. 9d. In the added limits of supply, the Company ask for the right to charge a price not exceeding 1s. 6d. per 1000 c.ft. more than the price for the time being charged to consumers under like circumstances within the existing limits of supply. As to the terms of the prepayment meter clause, the Company desire that they may be varied to 1s. 3d. for meter and fittings, and 1s. 6d. if a cooker is included. For a meter alone 6d. per 1000 c.ft. is proposed; or in all cases 10 p.ct. on cost, whichever may be the higher. Regarding calorific power, it is proposed that the standard shall now be 450 B.Th.U., instead of 540 B.Th.U. The following clause deals with the heat-unit basis of supply:

> The Company may expend any funds which the Company have already raised, or are authorized to raise, under any Act relating to the Company, or which may be in their possession or under their control, in the purchase or provision of any apparatus and appliances or other matters, and may take any steps which the Directors may consider desirable or convenient for the purpose of enabling the Company to adopt or to exercise powers under any General Act which may be passed in this or any future session of Parliament, and which may provide for, or deal with, the matter of the supply of gas on a heat-unit basis.

Profit-sharing clauses succeed; and then one which permits the Directors to grant pensions and retiring or superannuation allowances to officers and servants (other than weekly servants), provided that the total amount of payments made in any year does not exceed the equivalent of ½d. per 1000 c.ft. supplied during the year. Nothing is to exempt the Company or their undertaking from the provisions of any General Act relating to the supply of gas which may be passed in this or any future session of Parliament. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

In a Bill of varied composition, the TREDEGAR DISTRICT COUNCIL propose that, notwithstanding anything contained in section 57 of their Act of 1878, the Council shall be entitled to charge for gas a rate not exceeding 6s. 6d. per 1000 c.ft., or such higher price as they may fix with the approval of the Minister of Health. Powers are desired relating to the purchase and sale of coke-oven gas. [*Parliamentary Agents: Messrs. Lewin, Gregory, & Anderson.*]

The WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT COMPANY desire power to construct additional works for the storage of gas on certain lands acquired by them in the borough of Wandsworth, and which measure 6 acres 2 perches. In connection with other land in their possession on the banks of the Thames, the Company have provided a new causeway for public use; and they now ask for authority to discontinue one provided under their Act of 1900. The Company also wish for further powers in relation to the financing of the undertaking. The clauses dealing with these matters are brief; and the only one calling for notice shows that the additional capital power sought by the Company is for £500,000 of preference stock. It is desired that the borrowing powers shall be placed at the now usual one-third proportion. Annual meetings are provided for. Subsequent clauses deal with the issue of stock and other matters under the profit-sharing scheme. In regard to the heat-unit basis of conducting the gas business, the following clause appears:

> The Company may also apply their funds in providing any appliances or apparatus that may be necessary or desirable to enable them to conform to the provisions and obligations of any Public General Act which may be passed in the present or any ensuing session of Parliament, and which may make provision as to the basis upon which gas shall or may be supplied, or as to the basis or method of charging for gas, and may also take such steps as they may think fit to enable them to secure the benefit of, and to exercise, any powers of such Act.

There are no other clauses that require reference. [*Parliamentary Agents: Messrs. Lees and Co.*]

ELECTRICITY SUPPLY MEMORANDA.

ALL industries are suffering from the new economic standards that have been created, and have found it necessary to straighten-out matters so as to cause revenue to comply with expenditure, including a fair return on the capital employed. The gas industry is engaged on this task; and it is interesting to find that an important group of electrical companies consider it wise to approach Parliament to rearrange their statutory financial conditions, in much the same way (though the terms are not so good from the consumers' standpoint) as the South Metropolitan Gas Company are proposing. The Bill is being promoted by Edmundson's Electricity Corporation, the Urban Electric Supply Company, Twickenham and Teddington Electric Supply Company, Penzance and District Electric Supply Company, Ramsgate and District Electric Supply Company, Ilfracombe Electric Light and Power Company, and the Camborne Electricity Supply Company. The aggregate capital of the concerns is £1,300,000. In the preamble of the Bill, it is submitted that the revenue obtainable under existing powers is insufficient to cover expenses. The proposed method of remedying this is to raise the maximum price to what we believe to be the unprecedented height of 1s. 2d. per unit. When any such figures are talked about, the gas industry will not fear competition; and evidently such figures are inevitable under the new order of things, or they would not be proposed in the Bill. This high maximum price is not the only interesting feature of the measure. The electricity supply industry has never been under the same restrictions as the gas industry in regard to a sliding-scale of dividend and price. The Bill adopts what the South Metropolitan Gas Company would call a basic price, and other gas undertakings a standard price, of 1s. per unit. At this price, it is proposed that a dividend of 6 p.ct. shall be paid. This is the same as the South Metropolitan and South Suburban Gas Companies are contemplating; and, like the former Company, the Electric Bill suggests that the 6 p.ct. shall be taken (when profits permit) to be the minimum. It is also intended that an additional ½ p.ct. shall be paid "for each ½d. by which the highest price charged in one year is less than 1s. per unit." If the Bill goes through, it will form a very important precedent for electrical companies. But those who have been paying dividends such as 12 p.ct. will look dubiously on the regulated limitations which this group of companies are prepared to come under in order to get the advantage of a new maximum price almost double (in some cases double) the recognized figure before the war.

Electrical Financial Hardships and a Bill.

The Sale of Heat Units.

The "Electrical Review," which has been taking such a great interest in coal conservation, and is so anxious to fight and refute (but does not do so) the claims of gas undertakings to greater efficiency in its employment of coal than is realized at electrical stations, says that the Bill referred to touches upon a matter of crucial importance to a very wide section of the electricity supply industry. We believe it is speaking the truth there. But what is proposed by this group of electrical companies has such a strong likeness to what the South Metropolitan Gas Company are proposing that we may invite the interest of the "Review" in carrying comparison somewhat further than is done in the preceding paragraph. The Electricity Companies' Bill proposes 1s. as the basic or standard price for a unit of electricity, or

3420 B.Th.U.; the South Metropolitan Company propose 11d. per gas unit of 100,000 B.Th.U. We shall be met at once with the statement that the 1s. per unit is not for heating purposes. Agreed. To-day's prices for heating, however, range pretty generally between 2d. and 4d. per unit. If we are generous, and adopt 2d. per unit for heating, it means that the electricity consumer for heating purposes has 20,520 B.Th.U. delivered to him for 1s., as compared with 109,090 B.Th.U. under the terms put forward in its Bill by the South Metropolitan Gas Company. This means that upwards of 80 p.ct. of the heat units supplied by the latter would have to be wasted in order to reach equality with electricity, even if electricity could claim 100 p.ct. efficiency *for all heating purposes*, which it cannot do. For some purposes—such as hot-plates—it has not more than 40 p.ct. efficiency, or thereabouts, based on the electricity delivered, and when the elements are new; and time is against it in household economy. With modern gas appliances, thermal efficiencies compared with electrical appliances stand superior in some operations, and very little short in one or two others. The time spent in the operations is also in favour of gas; and thus for the household there is an economy all round in using gas for heating purposes. Here nothing is said as to the coke for sale and the other valuable secondary products from coal carbonization. The gas industry will soon (if the Board of Trade Bill, based on the proposals of the Fuel Research Board, meets with the approval of Parliament) be making and selling gas on the heat-unit basis—a method of which the British gas industry will be the pioneers, and one which is meeting with the approval of fuel economists not only in this country, but in other parts of the world.

The Consumer's "Allowance."

Very little has been heard of proposals from the electricity industry as to the distribution of the allowance of 10s. per ton on the coal used by them for the supply of current for domestic purposes. In some areas the division between the energy used for domestic and industrial purposes will not present a difficult problem, as many places—especially down South, outside London—have very little industrial use for electricity, as the concerns are operating in what are largely residential areas. Instead of reductions in price, the electrical papers week by week are announcing increases. At the same time, there does not appear to be any general appreciation as to the intentions of the Coal Controller in this matter. There are electricity concerns that are asserting that, even with the 10s. reduction, they are bound to make advances in price. As we understand the "Instructions" of the Coal Controller, the 10s. is not to affect the price charged at all; but it is to be distributed at the end of each quarter as a rebate on the accounts, *pro ratâ* according to the consumption—the first quarter taking into account the concessions from the price of coal obtained also during December. We have no expectation that the 10s. reduction on part of the coal is going to continue indefinitely. Therefore the maintenance of the charges independently of it, and the distribution of the 10s. as a rebate, will simplify matters very considerably; and should the 10s. be stopped later on, there will then be no occasion to readjust the price. In last week's "JOURNAL," it was mentioned that the Commercial Gas Company estimate that the 10s. will enable an allowance to their consumers of 7½d. per 1000 c.ft. We see the Electrical Engineer of Dundee calculates that in his case, the approximate "reduction" can only be 0·18d. per unit. This merely amounts to 1s. 6d. per 100 units; or 41½ units would, at 0·18d., be allowed a rebate of 7½d. In the paragraph in an electrical paper announcing this, it is remarked that since the time this calculation was made, there has been an increase in railway goods rates; and it is asked what effect this will have. It should have no effect so far as the 10s. is concerned, if prices are charged covering all outgoings, and the 10s. (less a fixed percentage for expenses) be deducted as an allowance from consumers' accounts.

Secrecy and Theatre Heating by Electricity.

In big leaded type, the "Electrical Review" gives a very guarded account of the warming of the Lyric Theatre, Hammersmith, by electrically heated radiators. It is referred to as an experiment; and everything regarding it is put in the vaguest possible manner. It is said that the installation has been at work for "some time," and that it is gratifying to record that it has fulfilled all expectations with regard to reliability and efficiency. In view of these statements, it is rather significant that no data are given. It is also remarked that electrical heating was decided upon only after "full consideration" of other systems; and it has now displaced throughout the building the gas-heated radiators which were formerly used. Then our contemporary thinks it will come as a surprise to some readers that the installation of the electrical system was found to be 65 p.ct. cheaper than a system of hot-water pipes to give the same results. But what would have been the comparative running costs—say using coke under the boiler? And cannot figures be given to show what is intended by the expression "same results," under equal atmospheric conditions? Moreover, the electrical system (we read) "has proved to be 50 p.ct. cheaper to run than the displaced gas system." What was the character of the system? And are the results equally good, or as good as could be obtained by the most efficient of modern gas systems? These figures, it is stated, are not estimated, but are based on several weeks' running costs. Then why are the running costs not given? Further, it is said that "the electricity supply, which is taken from the public supply mains, is not charged for at what might be termed a low rate." Why all this secrecy? If it is not charged for at an unduly low rate, there is no reason why the rate should not be stated publicly. Unless electric heating is unduly favoured, it cannot compete with gas to give an equality in heating results. The "Thermaglo" electric steam radiators that have been installed are so remarkably like gas-heated steam radiators in appearance that we have no hesitation in saying that in installation expenditure gas is the cheaper to instal. Then again one cannot get out of any heating apparatus more heat than is put into it. We should like to know the cubical capacity of the theatre. Because we learn from the description that in the main body of the theatre and corridors and on the stage, there are thirty radiators in use. It is said that each radiator is suitable for heating 1000 to 1200 c.ft. of air space under "average" conditions; the radiating surface being 20 superficial feet, and the loading 1000 watts—that is to say, to each radiator there is supplied the equivalent of 3420 B.Th.U. per hour. Electrical experts usually allow 1½ watts per cubic foot of air space, which is not adequate under all conditions. We much question the sufficiency of the provision in the Lyric Theatre on cold days, and with the feed water at low temperature. In fact, our contemporary understands that "the system of ventilation is now receiving attention, and by certain improvements that are to be made, it is expected that still more efficient results will be obtained from the heating system." The article says as little as possible, and positive data on essential points are kept hidden away. We are left wondering why, if all is as satisfactory as represented.

Joint Local Authorities.

The District Board promotion and generating station acquisition clauses of the original Electricity Bill having been hung up for a brief space, and the Act that has been passed having constituted Electricity Commissioners, and authorized the formation of Joint Electricity Authorities by voluntary action, there is evidence of a certain amount of liveliness in getting these formed, so as to escape the more drastic measures which the second instalment of legislation threatens to provide. The "Electrical Review" gives some indication of this liveliness. It first of all refers to the scheme of some time ago for South Lancashire, which could soon be revived. Then it tells us that considerable progress has been made in other areas, such as the West of Scotland, in South Wales and Monmouthshire, Dublin and district, and elsewhere with linking-up proposals, which should be of great assistance in connection with the more comprehensive projects now called for; and movements have been set on foot in the Midlands, at Dundee, Stalybridge, Bradford, Sheffield, and other centres towards the formation of joint authorities. The latest development comes from the West of England, where, for Gloucestershire and the surrounding counties, a joint electricity authority has already been provisionally arranged for undertakings within a radius of 30 miles of Bristol.

Coal Shortage and Electric Signs.

During the past few weeks, the newspapers have been printing columns daily as to the shortage of supplies of coal for household purposes; and we know that our Allies, Italy and France, are in the utmost extremity for coal. In spite of this, as a correspondent of "The Times" pointed out last week, electric advertising signs have been released in this country, and are again streaming out their announcements as to somebody's whisky or proprietary food, and making hideous the best of our streets in cities and towns. This comes on the lighting peak load, and is sheer waste. "Surely," says the correspondent, "someone is to blame for such manifest inconsistency.' These signs have no utility, save to serve private interests, and not those of the public. People do not require any reminding by an electric sign as they are walking along the streets that there is such a thing in existence as whisky. They are well aware of the fact; and it is only the price that troubles. If the advertising signs added to the beauty of the streets at night time, there would be something to be said in their favour; but they do not.

Motor Fuel Production in Small Gas-Works.—The "Technical Review" publishes an abstract of an article by Director Steding, in the "Journal für Gasbeleuchtung," in which the author argues that it will be profitable for the gas manufacturer to extract the benzol from the gas he produces. He says the removal of the benzol reduces the heating value of the gas by about 6 p.ct. Its extraction removes all the objectionable tendency to choke the burner and darken the mantle with deposited carbon; and the consumer gets compensation for the loss of heat in the maintenance of a better light, and a more constant heating effect in the case of cooking stoves. To the gas maker there is an undoubted gain from the technical point of view, for the extraction of benzol removes the naphthalene completely. Another effect of extracting the benzol is to lessen the weight of the gas. It is evident that, with clean pipes and a reduced weight of gas, there will be a better distribution of pressure throughout the system. If the same output of gas is to be maintained, production must be increased by 0·9 p.ct. As, however, the lighter gas will need a smaller pressure, the reduced leakage may render this increase in production unnecessary.

NITROGEN PRODUCTS COMMITTEE.

Final Report.

IN the form of a book consisting (with appendices, index, &c.) of over 350 foolscap pages, the Nitrogen Products Committee of the Munitions Inventions Department of the Ministry of Munitions of War have issued their final report. The Committee consisted of twenty-four members (some of whom were co-opted), with Colonel Sir Henry E. F. Goold-Adams, K.B.E., C.B., C.M.G., R.A., as Chairman. Among the members were Dr. Charles Carpenter, M.Inst.C.E., Mr. Kenneth M. Chance, M.A., Mr. W. R. Cooper, M.A., B.Sc., M.Inst.E.E. (representing the Physical Society), Sir Arthur Duckham, K.C.B., M.Inst.C.E., Dr. J. A. Harker, O.B.E., F.R.S. (Director of the Nitrogen Research Laboratory), Mr. Frank H. Jones, M.Inst.C.E., the Right Hon. Lord Moulton of Bank, G.B.E., K.C.B., M.A., LL.D., F.R.S. (Director-General of Explosives Supply), Mr. J. H. Rider, M.Inst.C.E., M.Inst.Mech.E., M.Inst.E.E., and Sir Richard Threlfall, K.B.E., M.A., F.R.S.

The Committee were appointed in June, 1916, to consider the relative advantages for this country and for the Empire of the various methods for the fixation of atmospheric nitrogen, from the point of view both of war and peace purposes; to ascertain their relative costs, and to advise on proposals relevant thereto; to examine into the supply of the raw materials required—pure nitrogen and hydrogen—and into the utilization of the bye-products obtained; and since some of the processes employed depend for their success upon the provision of large supplies of cheap power, to ascertain where and how this can best be obtained; to consider what steps can with advantage be taken to conserve and to increase the national resources in nitrogen-bearing compounds, and to limit their wastage; to carry out the experimental work necessary to arrive at definite conclusions as to the practicability and efficiency of such processes as may appear to be of value; and to advise as to starting operations on an industrial scale. It was found necessary to interpret the terms of reference in a liberal manner; and, as a result, the inquiry has been of very wide scope indeed.

In order to utilize the special qualifications and experience of the members to the best advantage, six Sub-Committees were appointed, to deal with different fields of investigation. One of these was the Gas-Firing Sub-Committee, consisting of Mr. W. R. Cooper (Chairman), Mr. Frank Jones, and Mr. Rider. This Sub-Committee (and the Power Sub-Committee) were to report upon the prospects of obtaining electrical energy at a sufficiently low cost for the operation of nitrogen fixation processes under British conditions, and upon the collateral problems of conserving and increasing the national resources in nitrogen products derivable from fuel used for power production or other purposes. The three gentlemen named, with Dr. Carpenter and Sir A. Duckham, were on the Power Sub-Committee; and included in the Processes Sub-Committee were Sir A. Duckham, Lord Moulton, and Sir R. Threlfall. The last-named Sub-Committee had to report upon methods and processes for the production of synthetic and non-synthetic nitrogen compounds, and upon the approximate costs of manufacture. Dr. Carpenter, Dr. Harker, and Sir R. Threlfall were also upon the Experiments Sub-Committee, to supervise the practical investigations demanded by some of the newer processes for obtaining nitrogen compounds.

In due course reports were submitted by the several Sub-Committees, embodying the results of their investigations of the different branches of the problem. In compiling their report, which is essentially based upon these sectional reports, the Committee have endeavoured to present a connected view of the nitrogen problem by utilizing the whole of the information that has become available during the inquiry. Adjustments have also been made in figures, where required in the light of more recent data. As to the starting of operations upon an industrial scale, certain measures which were clearly shown by the early stages of the investigation to be of practical utility for augmenting the home production of munitions were recommended in an interim report; and the work of the Committee up to that time was referred to in the "JOURNAL" for Dec. 4, 1917 [p. 456]. Since then, the exigencies of the war situation have been responsible for a fundamental alteration in the status of agriculture in the United Kingdom; and the present policy of food production has already had the effect of increasing the home demand for nitrogenous fertilizers to an extent far exceeding pre-war consumption. It has therefore been necessary to reconsider the adequacy or otherwise of the interim recommendations.

The report is set out under fourteen headings; and a complete summary of the more essential evidence and particulars collected and compiled by the Committee and the Sub-Committees is contained in five appendices. Pending an opportunity for further dealing, from the point of view of the gas industry, with the immense amount of information thus presented, Section XIV. of the report is now reproduced. It contains the

RECOMMENDATIONS OF THE COMMITTEE.

In making the recommendations set out below, the Committee have been guided by the following salient facts:

(*a*) The sources of supply of combined nitrogen in the United Kingdom must be increased considerably if the existing and prospective home demands are to be met and the pre-war scale of exportation is to be maintained.

(*b*) The existing sources of supply of combined nitrogen in the United Kingdom proved wholly inadequate for meeting the war demands.

(*c*) The risks and costs of importation during war are very serious.

(*d*) Combined nitrogen (as cyanamide or ammonium sulphate) can be obtained by synthetic processes at a cost, at the factory, which is less than half the market price of combined nitrogen from other sources—pre-war conditions being taken as the basis in each case.

(*e*) Concentrated nitric acid can be made by synthetic processes for about half the pre-war cost by the standard retort process, *viâ* Chile nitrate.

(*f*) The ammonia oxidation process provides a means whereby, during a state of war, the importation of Chile nitrate would be rendered unnecessary.

(*g*) The world's demand for combined nitrogen appears to double every ten years. The increased production during the war has not been more than the normal rate of increase during peace.

(*h*) The actual consumption of combined nitrogen for agriculture in the United Kingdom has practically doubled during the war, and there is certain to be a further increase.

(*i*) No very large increase in the output of bye-product ammonia in Great Britain in the immediate future seems probable.

The specific recommendations of the Committee are set out under various headings; and they embody the main recommendations put forward in the interim report. After mature consideration, the Committee see no reason for modifying the interim recommedations, and desire to re-affirm them.

PROVISION FOR NATIONAL SAFETY.

The following measures are recommended by the Committee as the minimum provision for safeguarding the future, and for meeting a portion of the growing home demand for various nitrogen products.

Calcium Cyanamide Process.

The Committee recommend that—

(*i*) This process should be established in Great Britain without delay, either by private enterprise (supported, if necessary, by the Government) or as a public work.

(*ii*) The scale of manufacture should be sufficient to give an output of about 60,000 tons of cyanamide per annum, equivalent on the basis of combined nitrogen to about one-eighth of the present home production of ammonium sulphate.

(*iii*) The necessary electrical energy should be obtained either from water power in Scotland or from a large steam-power station.

The Committee have ascertained from the Water Power Resources Committee of the Board of Trade that there are several sites in Scotland where the necessary water power can be developed at reasonable cost. If steam power is used, a suitable site for the cyanamide factory might be obtained at one of the central power stations proposed by the Board of Trade Committee on Electric Power Supply; and the costs given here are based upon this assumption.

On the basis of pre-war prices, *plus* 50 p.ct., the approximate capital outlay at a water-power site would be £1,680,000, inclusive of the capital cost of the hydro-electric development—the latter being taken at £40 per E.H.P. (£53·6 per KW.) of maximum demand. If the factory were erected at the site of a large steam-power station, the approximate outlay would be £800,000, inclusive of the proportionate cost of the power plant. The chemical sections for either site would cost about £445,000 of the above totals.

Upon the same basis—*i.e.*, pre-war prices, *plus* 50 p.ct.—the approximate cost, at the factory, of raw cyanamide (19·5 p.ct. nitrogen) would be—

ESTIMATED POST-WAR FACTORY COSTS OF RAW CYANAMIDE.

Source of Power.	Price of Electrical Energy, per KW.-year.	Factory Costs per Metric Ton of	
		Raw Product (19·5 p.ct. Nitrogen).	Combined Nitrogen as raw Cyanamide.
	£	£	£
Water	4·0	6·4	32·8
Steam (with coal at 11s. 3d. per ton)	5·6	7·0	36·0

The factory costs include interest on the capital outlay for the power section of the plant, but not on the chemical section, and are exclusive of any royalties.

The Committee have ascertained that plans and working drawings of the chemical sections of the plant can be obtained for a quite reasonable consideration. Moreover, as the result of the action taken upon the Committee's interim recommendations, considerable progress was made with the plans and specifications for a suitable steam-power station designed as the nucleus of a possible capital power station. These plans and specifications are available. The Committee suggest that it might prove desirable, in the first instance, to arrange for a certain proportion of

the calcium carbide produced as an intermediate product to be utilized as such, instead of converting it into cyanamide.

At the date of the interim report, the Committee were informed by the Board of Agriculture that the establishment of the calcium cyanamide industry in this country would meet with their approval. As the outcome of a recent communication, the Committee are authorized to state that the Board are still of opinion that the establishment of this process would be beneficial.

Synthetic Ammonia (Haber) Process.

This process has hitherto only been operated on a full commercial scale in Germany. Nevertheless, as a result of the continuous experiments carried out since the summer of 1916 at the Research Laboratory of the Munitions Inventions Department, the Government decided early in 1918 to erect a large factory at Billingham-on-Tees for the manufacture of synthetic ammonia and ammonium nitrate. This factory, projected as an emergency war measure, did not reach an advanced stage, through causes which it is unnecessary to specify; and in view of the altered situation, the need for the completion of the factory as an ammonium nitrate project no longer exists.

The Committee nevertheless recommend that the synthetic ammonia process should be established forthwith on a commercial unit scale, and extended as rapidly as possible as a post-war measure, up to a minimum manufacturing scale of 10,000 tons of ammonia (equivalent to 40,000 tons of ammonium sulphate) per annum. The Billingham factory should be utilized for the purpose, if such a course is practicable.

The evidence on the question of capital cost is somewhat uncertain; but the outlay for a factory of the capacity indicated, on the basis of pre-war prices, *plus* 50 p.ct., would probably amount to £600,000 if ammonia were the end-product, or to £780,000 if the factory were laid-out for the manufacture of synthetic ammonium sulphate.

Ammonia Oxidation Process.

This process, in its modern developments, has been proved to afford a reliable and simple means of obtaining nitric acid and nitrates. Early in the war, a full-scale installation was erected on the Thames by private enterprise, supported by the Government—the older method of oxidation being utilized. A long series of experiments carried out at the Research Laboratory of the Department, resulted in the design of a simple and modified plant which has been installed on a trial scale at several works in the country. The designs of the ammonia oxidation section of the Government ammonium nitrate factory referred to above were based upon the results obtained in these research and trial operations.

The Committee recommend that—

(*i*) An ammonia oxidation plant should be completed in conjunction with the synthetic ammonia factory already referred to, as was originally contemplated by the Government, on a scale sufficient to produce about 10,000 tons of strong nitric acid (95 p.ct.) per annum, or its equivalent in nitrates.

(*ii*) The plant should be designed to utilize either synthetic or bye-product ammonia as a raw material, because the national interests demand that adequate experience in the production of nitric acid from ammonia from all sources should be available in this country.

Upon the basis of pre-war prices, *plus* 50 p.ct., the estimated capital outlay for an installation having a capacity of 10,000 tons of strong nitric acid (calculated as 100 p.ct.) per annum would be £120,000.

The process, when thoroughly tested, will probably lead to the ultimate abandonment of the older retort method of producing nitric acid from Chile nitrate, and also to the abandonment of nitre pots in chamber sulphuric acid manufacture.

BYE-PRODUCT AMMONIA INDUSTRIES.

The Committee make the following recommendations for conserving and increasing the output of combined nitrogen from existing bye-product ammonia industries, for securing the better utilization of the national resources in coal, and for reducing the consumption of raw coal as a fuel:

(*i*) Encouragement should be given to facilitate and to ensure the replacement of non-recovery coke-ovens by recovery ovens at a much more rapid rate than hitherto, in order that the reserves of coking coal shall be utilized to the maximum advantage.

(*ii*) It should be incumbent on all gas-works which now contribute nitrogen to the home supplies of ammonia to put into practice the various simple expedients that have been proved to result in a considerable diminution in the loss of ammonia by volatilization or otherwise. The statutory powers administered by the Local Government Board through the Chief Inspector of Alkali Works, should, if necessary, be extended to ensure that this is done.

(*iii*) In collaboration with the responsible organization of the gas industry, a comprehensive scheme of ammonia recovery and collection (including the distribution of sulphuric acid) should be devised, which will be economically applicable to as many as possible of the smaller works where ammonia is at present allowed to run to waste. Wherever it can be shown that no financial loss would be incurred by any works included in the scheme, the works should be required, in the national interests, to co-operate. When a scheme has been devised, powers should, if necessary, be conferred upon the Local Government Board to ensure its operation and administration.

(*iv*) In collaboration with the responsible organizations of the bye-product ammonia industries, definite standards of efficiency in ammonia recovery should be formulated (based upon the qualities of coal in use and upon good average practice realized under the conditions in force at bye-product recovery installations of various classes and sizes); and all works contributing towards the home supplies of ammonia should be required to conform to appropriate standards of recovery. When such standards have been formulated, powers should, if necessary, be conferred upon the Local Government Board to ensure their observance.

(*v*) Encouragement should be given to all efforts to extend the use of coal gas and coke in place of raw coal for domestic purposes, for steam-raising, and for other industrial requirements.

TRIAL OPERATIONS AND RESEARCH.

With regard to the trial in the United Kingdom of various nitrogen fixation and recovery processes, and to the general question of research upon the nitrogen problem, the Committee make the following recommendations:

Häusser (or Explosion) Process.

The Committee recommend that plans and estimates should be prepared for a plant of the smallest size sufficient for the thorough testing of the modified process by which nitric acid and power can be obtained simultaneously. In the event of the estimates proving favourable, a company possessing a coke-oven installation of the necessary capacity, or other suitable supply of gas, should be encouraged to erect plant and carry out the trials.

Cyanide Processes.

The barium process, using externally-heated retorts, is at present under trial in this country. The Committee recommend that steps should be taken to test, by means of a trial plant on a small works scale, other modifications of the processes, and more especially internal electrical heating. The problem of devising a continuous process for the production of ammonia should be thoroughly investigated at the same plant.

Low-Temperature Carbonization of Coal.

This subject is under investigation by the Fuel Research Board. The Committee recommend that any commercial plant erected or about to be erected in this country should be thoroughly tested. In the national interests, the trials should be organized and carried out by the Government.

Sulphate Recovery Processes.

The Committee recommend that the possibilities of sulphate recovery processes which avoid the use of sulphuric acid should be thoroughly investigated on a commercial scale, and encouragement and assistance should be given to companies and undertakings willing to carry out the trials for the benefit of the bye-product ammonia industries as a whole.

Research.

The Committee recommend that—

(*i*) The researches on the nitrogen problem initiated during the war should be continued after the war under the auspices of the Government for the general benefit of the country.

(*ii*) The results of the researches carried out up to the present date should be edited and published at the earliest possible moment as a further appendix to this report, subject to such reservations as may be considered necessary by the Government.

(*iii*) Members of the Research Staff of the Munitions Inventions Department should be allowed to communicate to Scientific Societies the details of the work they have been engaged upon, subject to such reservations as may be considered necessary by the Government.

IMPERIAL SUPPLIES.

The Committee recommend that a co-ordinated policy should be framed for safeguarding the future nitrogen requirements of the Empire; and this should be done by an Imperial Authority. As the information that is now available concerning the future prospects and possibilities in the different portions of the Empire will require to be supplemented before any such policy can be framed, the Committee suggest that Advisory Bodies should be set up to examine the local aspects of the nitrogen problem, and to furnish the Imperial Authority with the requisite data.

OTHER RECOMMENDATIONS.

In connection with other aspects of the Committee's inquiry, the following additional matters arise:

Oxygen and Other Bye-Products from Nitrogen Plants.

The Committee recommend that—

(*i*) All liquid air nitrogen plants used in connection with nitrogen fixation installations in the United Kingdom should be operated to the maximum advantage for supplying the growing home demand for oxygen and argon.

(*ii*) The imposition of restrictive trade agreements—such as have been operative at nitrogen fixation installations abroad—which prevent the recovery and utilization of

bye-product oxygen from nitrogen plants, should not be permitted in this country.

Statistics.

The Committee recommend that comprehensive annual statistics for the nitrogen industries of the United Kingdom and for the home consumption of coal by various classes of users and industries should be officially collected, and a detailed summary of the figures should be published. Strong representations on this subject should be made to the Government Departments concerned. The Committee suggest that the question of statistics is also worthy of the attention of the Overseas Governments.

SPECIAL OBSERVATION.

As far as the United Kingdom is concerned, nitrogen fixation and allied processes will constitute a new "key" industry. The Committee are of the opinion that the initiation and development of the industry will require the active support of the Government.

Illinois Gas Association Convention.

Along with the publication of the programme for the sixteenth annual convention of the Illinois Gas Association, which is to be held in Chicago during March, the statement is made that the membership is now more than 500. The programme (containing a list of over a dozen papers) is at present only tentative, as it has yet to be submitted to the American Gas Association for approval, in accordance with the terms of affiliation under which the various bodies are co-operating. Already 50 companies, operating 66 plants, serving approximately 1,000,000 consumers, in 208 cities and villages, are represented in the Association. It is proposed at the convention to create a "company membership," the fee for which will probably be on a basis of 1·25,000th of the company's gross revenue from the sale of gas. The Association maintain two fellowships in "Gas Engineering" at the University of Illinois, and contribute $1000 a year towards their maintenance. They have also, says the "Gas Record," entered into a co-operative agreement with the United States Bureau of Mines, the Illinois State Geological Survey, and the University of Illinois, to carry out certain experiments relative to the production, distribution, and utilization of gas—more particularly such investigations as will render it possible to employ Illinois coal in the production of gas. In addition, the Association maintain an office, through which members are informed of legislative activities. They have a member on the Illinois Committee of Public Utility Information, which Committee are prepared to furnish to applicants the exact facts concerning any utility undertaking in the State—this information covering all phases of the utility business. Further than this, the Association maintain a bureau of information, through which members are supplied with particulars mostly of a technical nature. It also serves as a clearing-house for employers and employees, when the employers are looking out for competent help or when competent men are seeking positions.

Water Gas in France.—In connection with the removal of water-gas restrictions in France [see last week's "JOURNAL," p. 70], the Committee of the Société Technique, through the "Journal des Usines à Gaz," make a pressing appeal to French apparatus makers to proceed as quickly as possible with the manufacture of water-gas plant—not forgetting apparatus suitable for medium and small works. They are asked particularly to aim at a continuous type, which could be fitted, if necessary, in place of ordinary retort-settings.

Temporary Increase of Charges Act.—Orders have been made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act authorizing the Knaresborough Urban District Council to increase the maximum price of gas from 4s. 6d. to 5s. 9d. per 1000 c.ft.; and the Rhondda Urban District Council, from 6s. to 7s. per 1000 c.ft. The latter Order, which is dated Jan. 9, adds that the new maximum "shall be subject to such rebate on the accounts of consumers of gas used for domestic or household purposes as the Board of Trade may prescribe as necessary to give effect to the deduction of 10s. per ton in the price of coal used for the production of gas for domestic or household purposes."

Georges Claude Synthetic Ammonia Process.—"The Times" followed up their notice of the report of the Nitrogen Products Committee with the announcement that the rights of the new French Georges Claude synthetic ammonia process has been secured for the United Kingdom, South Africa, India, Australia, and New Zealand by Cumberland Coal, Power, and Chemicals, Ltd., of which Mr. A. E. Barton is Chairman, and with whom are associated a powerful and influential British financial group, who intend erecting extensive works in Cumberland as quickly as possible to produce on a large scale synthetic ammonia for the production of fertilizers, nitric acid, and other chemical products from ammonia. It is claimed that this system has enormous advantages over the German Haber process, and that, in fact, it represents the greatest development ever known in connection with nitrogenous products. About 25,000 acres of coal land, beginning at Maryport, have been acquired. The first unit of the plant to be installed will be of sufficient size to provide yearly 50,000 tons of sulphate of ammonia.

MINES AND QUARRIES REPORT FOR 1918.

AT the end of last week there was issued Part II. of the Home Office report on Mines and Quarries, for the year 1918. This is the part dealing with labour; and it states that the total number of persons ordinarily employed at mines and at the quarries under the Quarries Act in the United Kingdom and the Isle of Man during 1918 was 1,072,903, or a net decrease of 12,568 compared with the previous year. The output of coal was reduced from a total of 287,411,689 tons in 1913 to 227,714,579 tons in 1918—this being the lowest output since 1902, in which year 824,791 persons produced 227,084,781 tons. This decrease in the output was due to a number of causes, and principally to the heavy call that had to be made upon the younger and stronger members of the mining community by the naval and military services. Shortage of labour, difficulty in procuring materials, and "voluntary absenteeism" also contributed to it.

Suggestions are made in the report, in the belief that much can be done at many mines to mitigate the loss of output due to the shorter hours now being worked, by a reorganization of the arrangements at the mines. Mr. W. Walker, by whom the report is signed, says, in addition, that more machinery of the latest type, especially in connection with mechanical auxiliary haulage, should be introduced. Electrical apparatus and machinery should now be readily procured; and "in this respect it is well worth consideration whether the coal industry should not be given precedence over other industries in order to increase the output of coal." The number of electrically-driven coal-cutting machines in use at the end of 1918 was 1797; this figure representing an increase of 58 over the previous year. Seven deaths resulted from electric shocks. Six of them were below ground, as compared with two in 1917; but, with one or two possible exceptions, all might have been avoided by attention to simple and well-established safeguards.

There were in the year under review 1284 separate fatal accidents in and about mines and quarries, causing the loss of 1487 lives. Compared with the previous year, this is a decrease of 124 in the number of fatal accidents, and an increase of 36 in the number of lives lost. But for two accidents in which 174 lives were lost, there would have been a considerable reduction in the number of deaths in 1918 as compared with 1917. The actual death-rates for the year were 1·603 per 1000 persons employed underground, 0·566 per 1000 persons employed on the surface, and 1·379 per 1000 persons employed under and above ground at all mines.

Statistics have again been obtained with reference to the use of coal-cutting machines in the United Kingdom; and from these it appears that in 1918 there were 695 collieries where such machines were at work, as against 678 the previous year. The total number of machines employed was 4041, as compaaed with 3799 in 1917. The total quantity of mineral obtained by the aid of these machines in 1918 was 27,873,646 tons, which is a decrease of 322,840 tons on the preceding twelve months.

IRON AND STEEL TRADES LAST YEAR.

A CHEERY note is struck by Messrs. Bolling and Lowe, Ltd., in opening their review for the past year of the iron, steel, and allied trades; for they say that never in the history of these trades has the future—and more especially the near future—been so full of promise as it is to-day, owing to the world's depletion of all stocks. Labour, of course, as elsewhere, gives cause for anxiety, on account of its unreliability; but this is the only element of discouragement which they mention.

Considerable difficulties have hampered business during the past year; but the removal to a great extent of these is looked for by the firm when the Government cease control. In referring to tariffs, and calling for a definite explanation as to what are actually key industries, the opinion is expressed that "free trade" is beneficial to a large majority of all classes. "Most of us," it is added, "have realized of late that whenever a tax is imposed, the consumer pays it." Orders and inquiries for railway, shipbuilding, and constructional material for home consumption, and perhaps in a still greater degree for export, are, it is thought, unprecedented; but at the same time it has to be borne in mind that the world's production has increased by leaps and bounds in the recognized manufacturing countries. A table of price comparisons shows that on Jan. 1, 1919, hematite pig iron was £8 12s. 6d. per ton; and by Dec. 11, this figure had risen to £10 5s. In the same period, tin has gone up from £235 to £306 10s. per ton; lead, from £39 to £41 10s. per ton; and heavy steel rails, from £15 10s. to £16 15s. per ton. Copper has, however, receded from £112 to £101 per ton.

Glancing at the position of manufacturers in different parts of the world, it is noted that in France important sales have been made of both semi-finished and finished steel, though deliveries are, owing to strikes and railway congestion, frequently delayed. Some of the plants in Belgium have again been put in operation; and there is already an appreciable export. On the other hand, the condition of the iron and steel trade of Germany appears to be getting worse rather than better; the difficulty in obtaining raw material being increasingly felt. The Germans are unable to

enter the export market with any considerable tonnage; and from latest information received, Messrs. Bolling and Lowe think many months will elapse before this condition radically alters. To buy steel and many other manufactures from America is, they say, now almost prohibitive; and, besides, that country is to-day in the throes of labour troubles which have been anticipated for many years.

MIDLAND JUNIOR GAS ASSOCIATION.

A party of twenty members of the Midland Junior Gas Association paid a visit last Saturday week to the Saltley Gas-Works of the Birmingham Corporation. They were received by Mr. C. Carrington Barber, the Works Engineer (who is President of the Association), and welcomed in the name of the Gas Committee. Mr. J. Foster (Engineer-in-Chief) was unable to be present, owing to ill-health. The party were conducted over the works by Mr. Barber and Mr. Harvey, the Chemist in charge of the coke-ovens and Mond gas plant.

A coke-oven was discharged and charged. The various plant, old and new, was inspected, thus affording comparisons to be made (with regard to carbonizing, washing, scrubbing, and exhausting) which are not often possible on a large scale.

Tea was provided in the staff mess-room. A vote of thanks to the Gas Committee for allowing the visit, and for their hospitality, was moved by Mr. E. Scears (Rugby); and the thanks of the members were also extended to Mr. Barber and Mr. Harvey. The resolution was seconded by Mr. B. J. Bell (Birmingham). Mr. Barber, in reply, said the Gas Committee were always willing to provide Junior Associations with such facilities; and he was glad that the visit had been instructive.

A French Tar Producers' Association.

The current number of the "Journal des Usines à Gaz" publishes a notice of the Central Committee of Tar Producers and Distillers in France, which was formed on Nov. 7 last. On it are represented, with all the other chief producers, the gas companies. The President is M. Laurain, of the Paris Gas Company; and the Secretary and Treasurer, and two members of the Committee, are also of the gas industry. The avowed objects of the Association are the study and the protection of the economic, industrial, and commercial interests of the tar industry, and especially a consideration of the best means to adopt for increasing and regulating sales. The headquarters are provisionally situated at the offices of the commercial branch of the Paris Gas Company, No. 6, Rue Condorcet, Paris, IX.

The Right Hon. Sir John T. Brunner, Bart. (Chairman of Messrs. Brunner, Mond, & Co.), who died last July, left estate of the gross value of £899,112, the net personalty being £768,740.

After having occupied for the past thirteen years the position of Engineer and Manager of the Pontypridd Gas-Works, Mr. E. H. Swain has resigned in order to take up a Government appointment.

The Lord President of the Council has approved the appointmentment of Colonel Sir Frederic Nathan, K.B.E. (late R.A.), as Power Alcohol Investigation Officer under the Fuel Research Board of the Department of Scientific and Industrial Research.

There is to be a meeting of the Illuminating Engineering Society, at the Society of Arts next Tuesday evening, when a discussion on "Colour-Matching by Natural and Artificial Light" will be opened by Mr. W. C. Martin, of the Department of Technical Optics, Imperial College of Science.

There is to be a visit, on Wednesday afternoon, the 28th inst., of members of the Manchester and District Junior Gas Association to the works at Warrington of Messrs. Fletcher, Russell, & Co., Ltd. After tea with the Chairman and Directors, a paper will be read by Mr. I. H. Massey, of Oldham, on "Gas Appliances, Industrial and Domestic."

The retirement is announeed of M. Gautier from the directorship of the Havre Gas-Works. M. Gautier two years ago celebrated his fifty years jubilee in the profession, and has served the European Gas Company for thirty-three years. He has been a regular contributor to the "Transactions" of the Société Technique. His position at Havre will be taken by M. Coudelou, of Rouen, who will be replaced by M. Cros, of Boulogne. This station will then be taken over by M. Defoy, of Amiens.

A recent example of the practice of electric or acetylene welding of oil and gas pipe lines is its employment upon a 10-in. gas-line in California. The Public Service Company of Northern Illinois are also now constructing a new welded high-pressure line between the Blue Island Gas-Works and Harvey, for which 6-in., 4-in., and 3-in. mains are being laid. Various lengths of the pipe are welded, one after the other, until there is formed a continuous length of 1000 ft. The pipe is coated with a heavy pitch composition to protect the surface from rust. Valves are placed every half mile, with a special sleeve which permits the line to expand or contract without putting any strain on the valve itself.

THE COAL SITUATION IN GERMANY AND ITS BEARING ON THE GRADE OF GAS.

By Dr. KARL BUNTE, of Carlsruhe.

(*Continued from p. 25.*)

EFFECT OF INCREASED MAKE PER TON ON FUEL ECONOMY.

The most important point to be considered is the effect of increasing the production of gas from a given quantity of coal. How does it affect the question of the economy of fuel in general? Obviously an increased production of water gas entails a reduction in the quantity of coke available for sale. If in place of obtaining only 11,550 c.ft. of coal gas, of 570 B.Th.U. per ton of coal, a gas-works obtains 24,945 c.ft. of mixed gas of 419 B.Th.U., the heat units available in the form of gas are increased by 58·4 p.ct. If the coke made is taken as 70 p.ct. by weight of the coal carbonized, and 16 to 18 p.ct. of this 70 p.ct. is assumed to be consumed for heating the retort settings, there is 52 to 54 p.ct. of coke available for sale if coal gas only is made. But it becomes reduced to about 30 p.ct. if the mixed gas is produced. If the coke is assigned a calorific power of 12,600 B.Th.U. per lb., and it is assumed that when used as fuel 40 p.ct. of the calorific value is utilized, the production of the mixed gas involves a withdrawal of about 2,480,000 utilizable heat units from the coke market per ton of coal carbonized. If it is assumed that 90 p.ct. of the calorific value of the gas is utilizable in practice, the production of mixed gas entails a gain also of about 2,480,000 utilizable heat units in the form of gas per ton of coal used on the gas-works. Consequently, if 40 p.ct. heating efficiency from coke and 90 p.ct. from gas are regarded as equally reasonable assumptions, the heat units utilizable are the same whether coal gas alone or the mixed gas of 419 B.Th.U. per c.ft. is produced from the coal.

From the standpoint of the survival of gas-works in prevailing conditions of coal supply, the most important point is the securing of a sufficiency of gas from the available coal. The problem of the supply of coke must be solved independently. There is no question that the larger quantity of gas of lower calorific power can be produced from the limited supply of gas coal. The adoption of this procedure involves the transposition in the fuel market as a whole of the available heat units from the coke to the gas being supplied.

WATER-GAS PLANT IN SMALL WORKS.

The technical and economical interests of gas-works are thus wrapped-up in this question, whether of gas-works in general or of particular works. The first point is whether we are in a position to adopt the standard grade of gas which can be generally accepted, having regard to its involving the manufacture of water gas. Existing water-gas plants are almost all at the present time working to their full capacity. The question of the economies of expenditure on the erection of water gas-plant has altered greatly since 1914. It was then assumed that water-gas plant could only be economically employed by works manufacturing 70 million cubic feet and upwards of gas per annum. In 1918, this limit was lowered to about 35 millions per annum; but more recently a considerable number of gas-works in Germany of only half this annual output have adopted water-gas plant. Where it is a question of extensions, water-gas plant can be erected much more rapidly than other gas-making plant.

Of the whole of the gas produced in Germany, about 90 p.ct. is made in gas-works of a productive capacity exceeding 35 million cubic feet per annum. About 5½ p.ct. is made in works having an output between 17½ and 35 million cubic feet per annum, and the remaining 4·5 p.ct. in works of less than 17½ millions capacity. In considering the question of the addition of water gas and reducing calorific power, regard must also be paid to the production of water gas by steaming the charge in retorts and carbonizing chambers, as well as to the gas produced in coke-oven works. It is generally accepted that gas of a calorific power of 524 B.Th.U. gross cannot be generally supplied, while there is also general agreement that a standard of less than 450 B.Th.U. would be unacceptable. Assuming that the reduction is agreed to from 524 to 450 B.Th.U. gross, the significant consequences may be grouped under three headings—viz.: (1) The volume of gas made is increased; (2) the coke and bye-products available are reduced through the increased production of water gas; (3) diminution of the coke production is compensated for by the coke generally consumed on the gas-works being replaced by less valuable fuel.

EFFECT OF INCREASED VOLUME AND LOWER-GRADE GAS.

The necessity of distributing a larger volume of gas for the same number of heat units must, under certain conditions, react on the gasholder storage and the distributing system, the consumers' meters, and the consumers' appliances for using gas, but more particularly on the distribution of gas to a distance. The amount of gasholder storage will only cause difficulty in certain cases, because gas-works have been compelled of late to divert to electricity the consumption for lighting purposes which was the chief cause of large gasholder storage being required. The increased tax upon the distributing system is generally regarded as of no very great importance, because an increase of 16 p.ct. is regarded as normal over a period of two or three years. The increased tax on consumers' meters is a more serious matter;

and the war practice of cutting off or reducing supply at certain times of the day has resulted in an increased load on the meters at other times. In many places a considerable rise in the unaccounted-for gas has been ascribed to the over-loading of consumers' meters. For this, as well as other reasons, it is imperatively necessary that a decision should be arrived at forthwith whether high calorific power is to be reverted to, or whether low calorific power will continue. In the latter case, it will be necessary to exchange the consumers' meters for larger ones as soon as possible. The same argument applies to consumers' apparatus. With the diminution of calorific power, apparatus for the consumption of gas is taxed to a greater extent if its heating effect is to be the same in the same time. The requisite greater capacity can be secured by either increasing the supply pressure or by enlarging the nipples.

Pressure increases must also be made to correspond to the increased specific gravity of the gas, because the efflux of gas through an orifice is directly proportional to the square root of the pressure, and inversely proportional to the square root of the specific gravity. Consequently, if the specific gravity of the gas is increased from ·4 to ·5, the pressure must be raised from 4 in. to 5 in. if the same quantity of gas is to be consumed. Unless, however, the nipples are changed, the pressure must also be increased in inverse proportion to the square of the calorific power. Since 5 c.ft. of gas of 450 B.Th.U. must be consumed in place of 4·3 c.ft. of gas of 520 B.Th.U., it follows that the 5 in. pressure must be further increased by $\left(\frac{5{\cdot}2}{4{\cdot}3}\right)^2$, or (say) to 6·7 in. This increase of pressure may be regarded as inconsiderable, and the enlarging of the jets presents certain advantages in that it reduces the injecting action of the jets, which corresponds with the reduction in the air required by the gas. This regulation of the jets can also be put in hand directly it is settled that the lower calorific power is to continue.

Long Distance Supply.

Reduction of calorific power is most heavily felt in the supply of gas to a distance. On the other hand, the centralization of gas manufacture is eminently desirable on economical grounds. Distribution to a distance under a higher pressure than that thrown by the gasholders demands rather a concentation than a dilution of the heat units to be transported in the form of gas.

Summary.

The most important points arising from increase of volume and reduction of calorific power may be summarized for consideration as follows: One of the bitterest pills, which must, however, be swallowed, is the knowledge that in both the near and remote future the shortage of gas coal in respect of quantity and quality will not disappear. Some assistance may be afforded if the coke-oven works carbonize only as much coal as is necessary to produce the coke required for smelting purposes. Improvement in the quality of the coal must be demanded, and foreign coal must again be imported. Even so, reversion to the former conditions of gas supply is highly improbable, even in the tolerably remote future. The gas-works must, however, come to agreement as to uniformity of procedure. Bearing in mind the improbability that the old calorific standard of about 520 B.Th.U. can be maintained, the effects of a reduction to a minimum calorific power of 450 B.Th.U. gross have been indicated. It may be anticipated that the gas industry will be able to work to this standard with the gas coal available. The reduction of calorific power is, however, adverse to the supply of gas to a long distance, and, moreover, diminishes the quantity of coke for sale. A committee should be appointed to consider and report on these and other technical and economical questions arising out of the suggested reduction in the standard of calorific power, and to make recommendations for the future.

The faulty supply of coal to gas-works cannot, however, be overcome until the want of system in the distribution of coal is rectified. It is unsystematic to allow the coke-ovens to produce more coke than is required for smelting purposes, and distribution is unsystematic which follows the principle that "Coal is Coal." That this principle has been acted upon is shown by the fact that many gas-works know that coal has been delivered to electricity works which would have given much better gas-making results than the coal actually delivered to gas-works.

The German Gas Association has put forward to the German controlling authorities two representations which it regards as of supreme importance in connection with the socialization of the coal supply. In the first place, the pit or seam from which the coal has been raised should be recorded, and, in the second place, the coal should be sold on the basis of its degree of purity and value to the consumer. These requirements must be insisted upon as a guarantee of the origin and purity of the coal supplied in the future.

Coke Prices in France.—The "Journal des Usines à Gaz" states that the Professional Syndicate of the French Gas Industry have taken steps to impress on the Ministry for Industrial Reconstruction the exceedingly grave situation of the industry in France, due to the coal crisis, and the continued increases in the price of English and American coals. The Minister has asked for time to consider what steps can be taken to relieve the situation, but has meantime agreed to an increase of 35 frs. in the price of coke.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Meeting in Halifax.

A large gathering of members assembled at the Halifax Corporation Gas-Works, Mulcture Hall Road, on Saturday afternoon.

Mr. W. B. M'Lusky, the Gas Engineer and Manager, in extending the members a hearty welcome, announced that his son, Mr. James M'Lusky, who was to deliver his Presidential Address, had been unexpectedly called away to Scotland. Mr. C. D. Cawthra had, however, undertaken to read the address on his behalf.

In order to take advantage of the daylight, the visitors elected to immediately visit the works.

Round the Works.

The horizontal retort-house was built 47 years ago, during Mr. William Carr's period of office, and is still in good shape. The house contains four retort stacks each of five through beds of nine retorts (360 mouthpieces). The West's compressed air stoking machines (which have been employed in this house for upwards of twenty years) were recently fitted with discharging rams and projectors, and give most satisfactory results. There is a smart installation of 24 beds of inclined retorts producing 18,750 c.ft. of gas per retort per day. A hot-coke conveyor takes the coke to overhead screens and storage bunkers; and there is a conveyor for storing coke in the yard. There is also a three-gallery sorting plant for producing washed breeze; and an overhead clinker screening and picking belt deals with the clinker from the producers. A coal-store along the eastern boundary of the works serves the existing inclined house, and will also suffice for the vertical retorts when erected. The store is 900 ft. long, and is in communication with the L. & Y. & G.N. Railway systems, and has a capacity of 14,000 tons.

The Drake vertical retort installation, which is in course of erection, consists of six beds of eight retorts. The retorts taper from 36 in. by 21 in. at the bottom to 27 in. by 12 in. at the top, oval section, by 24 ft. 6 in. long. Each retort has a capacity of 2½ tons of coal per day. The installation will be served by a gravity bucket conveyor for coal and coke; the coal capacity being 50 tons per hour. An electric hoist will give access to all the stages. In addition, staircases serve each landing. The conveyor will deliver coke to either trucks on the high-level railway or to the coke yard as desired. The tops of the producers, which are on the ground floor, are level with the inclined discharging stage. The bye-products recovered include sulphate of ammonia, pure liquid ammonia, ferrocyanide of soda, and (during the war) benzol.

The distribution system of Halifax is most interesting. Owing to the hilly nature of the district, six station governors are required. In addition to these, two separately controlled high-pressure pipe lines, both for lighting and transmission, have been laid, to serve the valleys over and beyond the hills. They also supply high-pressure lighting for streets and shops. The borough covers an area of, roughly, 14,000 acres, and has 200 miles of ordinary mains and 8¼ miles of high-pressure mains. The residents of Halifax enjoy more land, breathing space, and more house room per inhabitant than any city, borough, or district in England. Practically every house in the town is supplied with gas. Those who have dispensed with gas for lighting are cheerful consumers of gas for other purposes. No brick is used in the buildings of the Halifax Gas-Works or in the town itself. The buildings are clean and of smart appearance.

THE BUSINESS MEETING.

After a look round the works, the visitors congregated in the Committee Room.

Mr. P. M'Nab (the Junior Vice-President) occupied the chair, and with a few brief remarks called upon Mr. Cawthra to read the Presidential Address of Mr. James M'Lusky, in his unavoidable absence.

PRESIDENTIAL ADDRESS.

An eminent authority in the gas industry some time ago declared to the Southern Junior Gas Association that, in his experience, the best training grounds for the gas engineer were Yorkshire and another place—called Scotland; and he suggested that those in want of the right material should as it were "pigeon hole" this information for reference. The honour of addressing men of such capacity is therefore great, and I appreciate it. The responsibility is also great; and I appreciate that too.

Let us critically review and examine our methods. Let us compare our work with that of others, and see where and how we stand. And what shall the measure be—the measure of the success of our undertakings? Shall it be technical efficiency, commercial results, financial stability, and resource? A high standard you say! Well, let us accept it. A high standard is the standard for us.

What is required of us to attain this high standard? Education and still more education (continuous, not intermittent), training, preparation and experience, and a working knowledge of the "History of the Art"—the history of accomplishment, of success, and the records of failure and warning. If we know what has happened, we can estimate what will happen in certain circumstances. We cannot "make circumstances," but we can "be prepared." We can fortify ourselves and our undertakings. Fore-

sight is the creature of knowledge and experience. The war has proved the need for foresight and resource. Our resources have been taxed to the straining point. Those who had the privilege of serving King and Country have witnessed the results upon their return to civil life. The fight has been won, and the damage must now be repaired. There is plenty of work in front of us; and those who served their country and the industry so well under war conditions will not fail to meet any emergency.

No industry and no class of men have stuck to it better than "gas men." Their experience, resource, and buoyant hopefulness surprised and won the praise of Lord Moulton, the head of the Ministry of Munitions Supply; and his letter of thanks to each individual engineer who helped him is modestly hidden away—a thing to be cherished but not for publication.

The surprising thing to the returned soldier, however, is the remarkably low selling price of gas compared with the prices of other commodities, and materials upon which the gas industry is dependent. Gas-works coal, which now contains 4 cwt. of clinker to the ton, has advanced threefold—200 p.ct. All other materials—such as mains, meters, and stoves—have similarly advanced; while chemical reagents (vitriol, copperas, and alkali) required for the working-up of bye-products have increased to an exorbitant extent. Wages have advanced too. But gas has advanced by (roundly) only 100 p.ct.

How has this been managed? Let us examine the figures. Let us observe the comparative low cost of production; and for this purpose extracts from the "Analysis of the Accounts of Gas Undertakings" will serve as an illustration and example. In the following tables the six corporations and the six companies having the lowest costs of production for the year—the year recorded in the last volume of the "Analyses" published is 1917 for the companies and 1917-18 for the corporations—appear in the order of merit as regards "Works Costs."

The remarkable feature of these results is that they have for the most part been obtained (in some cases entirely) by carbonizing plant which to-day, in the light of recent experience, will be considered obsolete. Works equipped with vertical retorts occupy a place in the tables, but not a conspicuous place. What are the causes contributing to the low cost of production? In the tables before us the answer is plain.

Look at Case "A" (Lancashire). Large returns from residual products earned and collected; low charges for wages resulting from the modernizing of the horizontal retort-settings *plus* machine stoking and good management. In four cases out of the twelve (A, B, C, and J), the wages over the four war years were reduced notwithstanding advances in hourly and weekly rates of wages. In one case, "C," the reduction was due to the introduction of vertical retorts. In the other three cases, horizontal retorts are still employed; but the work has been reorganized, and in all three case stoking machinery is now employed. The heavy charges for wages in case "I" (Lanarkshire Industrial Town) are due to the continuance of hand labour in the retort-house.

The item for repairs and maintenance of works has been reduced in no less than four cases out of the twelve—three being companies and one a corporation. The following particulars of the undertakings will be interesting:

CORPORATION UNDERTAKING "D" (Yorkshire). Inclined retorts in use.
GAS COMPANY "L" (Yorkshire) also uses inclines.
GAS COMPANY "J" (Somerset). Horizontal retorts and carbonizing machinery.
GAS COMPANY "I" (Lanarkshire). Horizontal retorts and shovel-charging.

The case "C" should also be noted. By the introduction of vertical retorts, it has been possible to keep-down the cost of repairs to the pre-war level in this case.

In the Midland town "E," where some verticals have been introduced, similar economy has been effected, although in this case the total amount for repairs in both periods 1913-14 and 1917-18 is relatively high. It is, in fact, the highest but one for 1917-18.

The total cost at works varying from the highest of the twelve, 14·13d. to 17·03d. in the best example of all, is very creditable indeed; and the returns as they are published from year to year should prove more interesting, taking into account the progress which has been made in the manufacture of gas during the past eighteen months.

The remarkable durability of vertical retorts has been established; and as years go by the effect of the saving in repairs will stand out prominently in the accounts.

Other influences, of course, affect the item for repairs. Undertaking "H" (Derbyshire), for example, does itself well under this item. It spends more money on repairs than any other undertaking in the group of twelve; and yet it occupies the eighth place in the table. The high expenditure in this case may be attributed to foresight—provision for a rainy day. It is a coincidence that the corporations monopolize the first six places.

CORPORATIONS.

Cost of Production of Gas.

		Coal less Residuals per 1000 c.ft. of Gas Sold.	Carbonizing Wages.	Repairs and Maintenance of Works.	Total.	Average Price Received. 1917-18.	Price of Gas. Now.	Price of Gas. Pre-War.	Carbonizing Plant Employed at the Latest Date.
		d.	d.	d.	d.	s. d.	s. d.	s. d.	
1917-18	A	2·29	1·00	3·74	7·43	1 3·80	2 9	1 0	Horizontal retorts and carbonizing machinery
1913-14	a	0·52	2·67	1·45					
1917-18	B	5·65	1·11	3·48	10·24	2 5·99	3 0	1 10	Ditto
1913-14	b	2·02	1·16	2·40					
1917-18	C	5·16	2·45	2·63	10·24	2 7·36	3 4	1 8	Verticals
1913-14	c	4·82	3·23	2·60					
1917-18	D	4·99	2·47	3·97	11·43	3 0·81	4 3	2 6	Inclines
1913-14	d	2·63	2·35	4·36					
1917-18	E	4·65	1·86	5·62	12·13	2 9·35	4 4	2 2	Horizontals and carbonizing machinery—some verticals
1913-14	e	1·92	1·68	5·41					
1917-18	F	5·31	2·80	4·40	12·51	2 4·93	4 0	2 0	Inclines and horizontals with carbonizing machinery
1913-14	f	2·92	2·07	3·26					

COMPANIES.

						1917.			
1917	G	6·80	2·72	3·67	13·19	1 6·57	4 0	1 3	Horizontals and carb. machinery
1913	g	1·46	1·88	3·47					
1917	H	5·39	2·21	5·99	13·59	2 2·35	3 1	2 2	Horizontals and carb. machinery—some verticals
1913	h	0·99	1·96	5·02					
1917	I	6·56	6·24	0·79	13·59	2 1·25	2 10	1 6	Horizontals, shovel charging, hand rake drawing
1913	i	1·19	4·83	0·96					
1917	J	7·89	1·78	4·24	13·91	2 0·03	2 0	1 10	Horizontals, carb. machinery
1913	j	5·69	1·94	4·34					
1917	K	6·92	1·48	5·69	14·09	2 3·45	4 1	2 4	Inclines
1913	k	3·23	1·33	7·03					
1917	L	6·39	2·90	4·84	14·13	2 0·97	3 4	2 1	Horizontals and carb. machinery—some verticals
1913	l	2·92	1·93	2·66					

SELLING PRICES.

The price at which gas can now be sold depends upon circumstances beyond the control of the engineer and manager, and certainly beyond the control of the present directors or members of gas committees.

"J" produces gas at a cost of 13·91d.; but it is necessary to charge the consumer 2s. 6d. per 1000 c.ft. At "E," the cost of production is 12·13d.; and the price charged to the consumer is 4s. 4d. This is a corporation undertaking. The capital charges are high, the reserve fund is well maintained, and over 3d. per 1000 c.ft. of gas sold is transferred to the relief of the rates. Many undertakings (more particularly those owned by corporations) are over-capitalized—in plain terms, they are overburdened with debt. It is a terrible mistake to borrow other people's money and spend it foolishly. If we only spend what we have got—more especially what we have earned by good management—we shall be safe. Don't spend borrowed money! It will be argued that urgent improvements cannot be delayed until the money for their payment is earned. To a limited extent this is true. But if we are determined to avoid the burden of debt, we must meet all our obligations out of revenue; and if we are determined to pursue this policy, we shall recommend only such expenditure as we can redeem out of the increased profits earned by the new plant or process. If the scheme of improvement will not meet this annual charge, leave it alone.

The policy of meeting extensions and improvements out of revenue presents difficulties in the case of statutory gas companies. Difficulties are met only to be overcome, and statutory and other companies have a wonderful capacity for

overcoming such difficulties. The tables shown afford striking illustrations of undertakings of this character (undertakings which have developed phenomenally) which are indeed thriving in these days of "financial hardships."

On the other hand, many corporation undertakings are crippled to-day by the extravagant expenditure of borrowed money—money borrowed with a light heart when the rate of interest was 3 p.ct. to 3½ p.ct., to be repaid to-day at 5 p.ct. and over. As the inevitable result, we have the large towns in Yorkshire and other places charging consumers prices varying from 4s. to 4s. 10d. by ordinary meter; while a little village on the Yorkshire Moors, with an output of only 41,000,000 c.ft. per annum, jogs along quietly with a maximum price of 2s. 6½d. per 1000 c.ft. for illuminating gas, which, by the way, is but a half-penny above the lowest selling price in the country to-day. The works referred to—owned by the local authority—are wisely protected by a clause in their Act of Parliament, which provides that all profits should be applied to the redemption of the loan debt on the undertaking. Had this principle been applied in other Yorkshire towns, the burden of debt would in some cases have been entirely wiped off, and the selling price of gas would have been low enough to encourage the use of the commodity and develop the business of gas supply for all purposes. Under such conditions the revenue would have been much greater than it ever can be under the present policy; and the profits available would have been sufficient to relieve the gas consumers as well as the rates.

FUEL ECONOMY.

It has been remarked that the system of carbonizing employed does not appear to have materially affected the final figures for works cost. It cannot be urged that any particular system of carbonization stands out in contrast to others as a conspicuous example of economy when the three main items under consideration are added together. One may show a lower cost in wages and a higher charge for repairs and maintenance, and another may show a higher cost for wages and a lower charge for repairs and maintenance; but the advantages appear to be fairly equally balanced. A close examination of the item representing net cost of coal less residuals reveals an astonishing position as regards fuel economy, and one which will well repay examination.

Undertakings with what we now call a large make per ton have not won a place in the foregoing tables of high efficiency works. There are twelve works in the table which show the lowest cost of production in the country; and the make of gas per ton of coal recorded for these works varies from 9083 to 13,505 c.ft. It is well known that the make of gas per ton of coal can be pushed beyond the paying point. We are dealing now with a difficult problem—a problem of the cost of materials used and the money received for the products sold per ton of coal purchased. Coal has advanced in price to the extent of 200 p.ct.; coke, to the extent of 250 p.ct.; and gas only brings in, on the average, about 100 p.ct. more than the pre-war revenue. Obviously we must not waste coke. Therefore, if the making of money was the only consideration, we ought to sell more coke and less gas per ton of coal purchased. There is, naturally, a point at which this policy would have to stop; and for the sake of argument the following standard might be set up:

Gas sold per ton of coal carbonized	12,000 c.ft.
Coke available for sale after heating retort settings	10 cwt.
Value of coke	2s. per cwt.
Gas sold per 1 cwt. of coal, purchased	600 c.ft.
Coal gas, 550 B.Th.U. gross.	
Gas sold per 1 cwt. of coke used for the manufacture of blue gas	2400 c.ft.
300 B.Th.U. gross.	

With coke at 2s. per cwt., blue gas therefore costs 10d. per 1000 c.ft. for fuel alone. This is an enormous price to pay for fuel compared with the cost of coal, less residuals, shown in the table. From the commercial point of view, we cannot afford to use coke for the manufacture of gas at present prices. We are not free agents, however; and so long as we are under control, we shall have to "do our bit." A number of works in this district at the present time are using only 80 p.ct. of the coal carbonized before the war—that is to say, the make of gas per ton of coal has been increased 25 p.ct. by the use of valuable coke for gas making. This represents a serious loss to the gas undertakings—a loss which will probably have to continue for some time to come. It is one of the "financial hardships" forced upon gas undertakings in consequence of the war.

Possibly a good deal of misunderstanding exists as to what may be regarded as good carbonizing practice. The conjurer will place a brightly gleaming object before his audience to distract their attention while he juggles with the elements behind it. In like manner the gas engineer presents the attraction of a large make of gas per ton of coal. The cost of a large make per ton is:

Case 1 (Lancashire) Horizontals.—Sale of gas per ton of coal		11,056 c.ft.
Coke sold		11 cwt.
Net coal less residuals		2s. 1·29d.
Net cost per 1000 c.ft.		2·29d.
Net coal less residuals	2s. 1·29d.	
Add difference in coke	2 0	(1 cwt. above standard)
	4s. 1·29d.	
4s. 1·29d. ÷ 12 = 4·10d. per 1000 c.ft.		
Actual cost = 2·29 ,, ,,		
Saving = 1·81d. ,, ,,		

Case 2 (Yorkshire) Horizontals.—Sale of gas per ton of coal		11,574 c.ft.
Coke sold		11·2 cwt.
Net cost of coal less residuals		6s. 3·94d.
Net cost per 1000 c.ft.		6·56d.
Net cost of coal, &c.	6s. 3·94d.	
Add cost of coke sold above standard	2 4·80	
	8s. 8·74d.	
8s. 8·74d. ÷ 12 = 8·72d. per 1000 c.ft.		
Actual cost = 6·56 ,, ,,		
Saving = 2·16d. ,, ,,		

Case 3 (Lancashire) Verticals.—Sale of gas per ton of coal		14,680 c.ft.
Coke sold		9·8 cwt.
Net cost of coal less residuals		8s. 10·78d.
Net cost per 1000 c.ft.		7·28d.
Net cost of coal, &c.	8s. 10·78d.	
Deduct cost of coke below standard	4·80	
	8s. 5·98d.	
8s. 5·98d. ÷ 12 = 8·499d.		
Actual cost = 7·28		
Saving = 1·219d.		

Case 4 (Lancashire) Verticals.—Sale of gas per ton of coal		14,070 c.ft.
Coke sold		8·2 cwt.
Net cost of coal less residuals		10s. 7·31d.
Net cost per 1000 c.ft.		9·05d.
Net cost of coal, &c.	10s. 7·31d.	
Deduct cost of coke below standard	3s. 7·20	
	7s. 0·11d.	
7s. 0·11d. ÷ 12 = 7·01d.		
Actual cost = 9·05		
Loss = 2·04d.		

These results correspond closely with each other. Greater variations may be found between an equal number of gas-works using the same class of coal and precisely the same system of carbonization. In estimating the value of the production of a ton of coal, we must not leave any product out of consideration, and we must endeavour to adjust our processes and methods of working from time to time to meet the varying conditions of supply and demand.

LIFE OF THE PLANT.

Another important consideration when change is contemplated is the life or durability of the various systems brought under review. This remark applies particularly to carbonizing plant and machinery. To renew a stack of modern horizontal retorts twelve months ago—producer, regenerator, and retort setting—would, for material and labour alone, have cost a sum which, calculated on a four years' life, would have been equal to 1·230d. per 1000 c.ft. of 500 B.Th.U. produced by the setting during the four years, or equivalent to 0·246d. per "therm." The amount paid for renewals of verticals twelve months ago would, on the basis of a six years' life, have been 0·870d. per 1000 c.ft., or 0·174d. per therm. These figures are based on the actual cost of work done and upon the actual life of both kinds of settings in this district.

The four cases cited embrace two of the best examples of horizontal stacks and two of the best examples of vertical retort stacks. All four installations were new within the past four years, and all the gas is produced by the system named. The two horizontal cases are examples of most modern and up-to-date horizontal retorts with stoking machinery and coke-handling plant; and the two examples of vertical retorts quoted are unexcelled in this country. The results, on the basis of the published statistics, show that case "A" beat the standard by 1·81d. per 1000 c.ft.; case "B," by 2·16d.; and case "C," by 1·21d.; while case "D" lost on the standard to the extent of 2·04d.

VOTES OF THANKS.

Mr. E. A. LEASK (Leeds), in moving a vote of thanks to the President, remarked on the great care and pains he must have taken in preparing such an address, dealing at length with comparisons of considerable moment to everybody interested in the gas industry. The speaker noted that gas companies had kept under the 100 p.ct. increase.

Mr. J. B. BALMFORTH (Bingley), in seconding the motion, regretted that Mr. M'Lusky was unable to be present.

The resolution was carried with applause.

A vote of thanks was accorded to Mr. Cawthra for his kindness in filling the breach.

Mr. CAWTHRA, in replying to the vote of thanks, said it had been a great privilege and pleasure to read Mr. M'Lusky's address. In going through the address, it struck him that considering even now, at present prices for material and labour, one could renew seven beds of horizontal retorts for £6000, which on their present make per mouthpiece with plant more than 20 years old will give them 1,000,000 c.ft. of gas per day from coal containing 4 cwt. of clinker per ton, very serious consideration must be given before embarking on schemes entailing capital outlay on new plant. Another thing that struck him was the fact that in everyday life there was always a rush for special editions; and he hoped that Mr. M'Lusky's address would have the result, at all events among the Yorkshire Juniors, of stimulating a spirit of rush for an early view of those editions of the Technical Press which contain the working results of gas undertakings.

Mr. M'NAB proposed, and the HON. SECRETARY (Mr. F. PEEL) seconded, a hearty vote of thanks to Mr. W. B. M'Lusky, the Engineer and Manager, and to the Halifax Corporation Gas Committee, for placing the meeting room at the disposal of the Association, for

the inspection of the works, and the opportunity of visiting the new gas show-rooms during the evening.

Mr. M'LUSKY replied on behalf of himself and the Gas Committee, and said how pleased both himself and the Committee were to have a visit from the Association.

The party were then provided with tea by the Gas Committee. While tea was being partaken of, the Association were honoured by a visit from the Chairman of the Halifax Gas Committee (Mr. Waddington). At the termination of this pleasant function, Mr. M'Nab called upon Mr. Waddington to say a few words.

Mr. WADDINGTON promptly took advantage of the invitation, and said how pleased he was to see so many young and enthusiastic men among those present, and hoped that they had found something very interesting and instructive at Halifax. He looked upon the gas industry as one of the most important industries at the present time. He suggested that Junior Associations should make application to responsible authorities to grant an annual subscription or allowances to enable the members to travel and help them in the study and research of their industry.

The visitors then proceeded to Water-house Street to visit the new gas show-rooms.

AT THE NEW SHOW-ROOMS.

The show-rooms have been extended recently, and present the appearance that one associates with first-class business premises in a good business thoroughfare. The entrance on the street level is good. The rooms are spacious, and the principal appliances are shown in character, and are very effective. There is a kitchen and scullery in the basement fitted up as a working home. The first floor (at the street level) consists of four rooms—two for display, and two fitted up in character, one as a bathroom the other as a parlour. On the second floor there is a lecture room, the platform of which is fitted as a small kitchen.

The lighting of the premises is artistic. The walls are white, and the frieze (which is a very deep one) is also white; and all the lighting is semi-indirect. Other lights are, of course, fitted at different points; but only for display and sale. The walls are plain; the woodwork being polished mahogany. The quantity of apparatus shown does not crowd the premises, and is laid out in an attractive manner. A feature of the business is the use that is made of the premises by the public. The average number of callers is over a thousand persons per week. The business, which consists chiefly of "Sale" and "Hire-Purchase," grows steadily.

REFRACTORY PROBLEMS OF THE GAS INDUSTRY.

At a symposium on refractories recently held by the American Chemical Society, a paper was presented by Messrs. W. H. FULWEILER and J. H. TAUSSIG (of the United Gas Improvement Company, Philadelphia), bearing the above title, and dealing mainly with vertical retorts and the manufacture of water gas A few points from the paper were reproduced in the "JOURNAL" for Dec. 30 [p. 717]; and these may now be supplemented by the following:

In the vertical retort system, the temperature in the combustion chamber is 1450° to 1550° C., and in the lower part of the retorts from 1350° to 1500° C. This temperature in the retort chambers gradually decreases upwards to about 850° C. at the top, where the gases enter the recuperators. The temperature continues gradually decreasing through the recuperator, from which the gases pass away at a temperature between 480° and 530° C. The incoming atmospheric air leaves the recuperator at about 760° C. Under the diverse conditions that exist in a modern retort bench, it has been necessary for economy to use both silica and fire-clay materials; and this makes the design and construction of these benches a very complex problem.

The combustion chamber lining, retorts, and connecting blocks, which are exposed to a temperature of 1550° C., are made of high-grade silica material, containing over 96 p.ct. of silica, with about 1·5 p.ct. of lime, which acts as a bond. The recuperators, where the temperature varies from that of the atmosphere to 850° C. normal and 1100° C. maximum, are made of fire-clay containing 55 p.ct. silica; the rest being alumina, with small quantities of lime, ferric oxide, &c. Owing to the rapid changes of temperature at the tops and bottoms of the retorts—caused by the high conductivity and radiation of the iron-work—fire-clay is used in these sections, because of its lower coefficient of expansion, and its ability to resist any spalling action under these conditions. The outside walls, being exposed only to moderate temperatures, are made of a lower grade of fire-brick. The whole bench structure is insulated with a covering of bricks made from infusorial earth.

In spite of the care used in the selection of materials, failures of refractories sometimes occur from carelessness in operation, owing to the generation of excessive temperatures.

In water-gas plants, the generator linings are subjected at the top to abrasion by the descending fuel, and by the small particles whirled about by the blast, and also to the effect of tools used for removing clinkers. The central combustion zone is very hot, owing to the preliminary combustion of the fuel. There is slagging action due to the ash of the fuel, some abrasion due to the fuel, and, with various kinds of fuel, serious abrasion caused in the removal of clinker. The lower portion of the generator, though not so hot, is subject to the effects of steam on the up-run, the hot gases on the down-run, and the effect of tools in removing the clinker periodically. The connections between the generator and the carburettor are subjected to high temperature, erosion due to fuel particles passing through quickly, and some slagging action from the ash. The lining bricks of the carburettor are subjected to only moderate temperature; but the chequer-bricks and the crown are exposed to a temperature of perhaps 1200° C. during the blasting, and are then deluged with a spray of cold oil during the gas-making period. This results in an accelerated spalling action on the chequer-bricks, and has necessitated the development of a special test to determine what bricks are suitable for this work.

The two important points in the selection of materials are the generator lining and the chequer-bricks. In the selection of material for the generator lining, the relatively high temperature (due to the combustion of fuel), and the action of the clinker as a slag, have to be considered. Analyses of the ashes of various generator fuels show silica ranging from 28·0 to 54·1 p.ct., alumina from 8·3 to 42·0 p.ct., ferric oxide from 5·0 to 49·9 p.ct., lime from 1·5 to 10·4 p.ct., magnesia from traces to 5·8 p.ct., and SO_3 from 0·7 to 8·5 p.ct., with from 0·1 to 1·4 p.ct. undetermined.

The fusing-points of the same ashes ranged from 1090° to 1660° C. The very great variation results in the development of three distinct classes of clinker. The ashes with high fusing-points tend to build-out on the sides of the generator, thus considerably reducing the working area. This type of clinker does not seriously deteriorate the lining in a chemical sense; but the abrasion in barring-down the deposit is very destructive. The ashes with moderate fusing temperature for the most part collect on the grate, forming a compact mass which can be removed without much difficulty. The ashes with a low fusing-point—generally high in iron and rather low in alumina—seriously attack the linings, and also collect on the grate to form a hard compact mass, which is difficult to remove when cold. In extreme cases they may even melt, and form stalactites in the ash-pit.

The usual lining block is of fire-clay. Silica materials have not been generally successful, because of extreme and very frequent changes in temperature during use. Experimental trials with magnesite have not been very successful, because of spalling. Recently, magnesite blocks enclosed in a thin iron casing seem to have been somewhat more successful. Chrome bricks have been tried; but sufficient data are not as yet available. Zircon bricks are very expensive; but their special properties may, perhaps, warrant more extensive trials. Carborundum materials have been tried as solid bricks and as veneered bricks. The solid brick is much stronger; and its extra cost will probably be compensated by a longer life. With all these neutral materials the adhesion of the slags to the sides is eliminated, along with possible corrosive action; and consequently less time is required for cleaning the sets.

For chequer-bricks to resist spalling action (due to alternate heating and cooling), it has been found that bricks of the flint-clay type, with rather coarse grog and a minimum amount of plastic clay, are generally better than others. A dense brick that would not absorb the oil should apparently be more satisfactory; but such bricks do not generally resist spalling action. The fire-clay linings of the connections between the different shells are often nearly cut-away by the abrasive action of coke particles in the gaseous current, and by the slagging action of the ash. This abrasive action needs consideration.

It is believed that many failures attributed to the refractory material have really been due to the use of improper cements. The average mason likes cement which works easily under the trowel; and there is a tendency to add plastic clay, or some similar material, to the more refractory cements. The use of such material reduces the refractory qualities of the cement, and the resulting jointing material fuses. This deterioration may even extend to the bricks. In general, better results are obtained on construction work by using a cement consisting chiefly of ground material similar in quality to the grog in the bricks, and a minimum amount of material of lower fusibility. In using silica shapes, cementing material is often omitted—the bricks or shapes being separated by corrugated cardboard of such thickness that at the proper temperature the expansion will form a sufficiently tight joint.

Useful laboratory tests for the control of material include tests for resistance to deformation at high temperature, for slagging action, fusibility, and spalling action. In connection with resistance to deformation under load, an automatic device is used, which determines the expansion of the specimens under different loads at various temperatures. This is very important, so that proper allowances for expansion may be made in the design and construction of bench work.

Shortage of Coal in Denmark.—Denmark is suffering considerably from coal shortage, due principally to difficulty in obtaining supplies from this country. During the war Denmark received 100,000 tons a month, and after the armistice 150,000 tons. As regards German coal, Denmark received in the last two years about 100,000 tons monthly; but after the armistice imports sank until, in October and November last, they amounted to only about 16,000 tons of gas coal per month, which is less than one-half of what the provincial gas-works use. This gas coal, too, is very dear. While it costs in Germany only 70 m. to 80 m., the price to foreign countries is 1500 m. per ton. The Secretary of the Danish Coal Committee recently paid another visit to Germany to try to get a reduction in price; but nothing has so far been achieved.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Calculating the First Allowance.

SIR,—As one who regularly turns to your columns for guidance, and is grateful for the valuable suggestions and help obtained from them, I venture to express my disappointment with the notes in your last two issues, on the Coal Controller's Instructions. To my mind, these do not show that thorough understanding of the subject which we are accustomed to look for in your editorials.

For instance, you criticize the directions for determining the allowance to be made to domestic consumers, because "total tons" and "gas sold" are mentioned without the inclusion of the words "domestic or household." It should, however, be obvious that the omission of these words is intentional, since it makes no difference whether we divide the total tons by the gas sold, or the domestic coal (a percentage of the total) by the domestic gas, which is the same percentage of the gas sold.

You express surprise that the Commercial Gas Company have been able in so short a time to arrive at the proportions used for domestic and industrial purposes, "so as to enable them to compute the allowance for domestic purposes as distinct from industrial uses." There is no evidence whatever to show that they have arrived at the proportions. The data required to fix the amount of the allowance for the current quarter are simply the tons of coal used in the quarter (known) and the quantity of gas sold (readily estimated from known make).

You speak of the allowance being estimated in a liberal spirit. In this matter, gas companies are not called upon to be liberal or generous, but simply just. They make certain deductions from their coal accounts. The money so deducted does not belong to them. They are in the position of trustees for the domestic consumers, among whom the whole of the fund, less the allowance for expenses, must eventually be distributed.

Your idea that the first and second clauses of "Instruction No. 2" are at variance appears to me to arise from a misunderstanding of the meaning of the second clause. Such a misunderstanding is not surprising, since the paragraph is a typical example of what Sir Arthur Quiller-Couch calls "Jargon" (how can "an allowance . . . take account of" anything?")

The paragraph has nothing whatever to do with the method of ascertaining the allowance; and the fact which a correspondent points out—that accounts may be sent out before the 31st of March, when we know neither the quantity of gas that will be consumed nor the coal that will be delivered—is not of the slightest consequence, since neither of these figures is required to determine the amount to be allowed. We are not instructed to distribute, or to attempt to distribute, the whole of the rebates received; we are merely told to take account of them. To confuse the making of an allowance with the taking into account of the rebates, is fatal to a clear understanding of the instruction.

An outline of the method which I intend to adopt may perhaps make my meaning plainer. For the current quarter, an allowance will be made to all domestic consumers at the rate of 10d. per 1000 c.ft., and the total amount so allowed will be debited to a "Domestic Allowances" account. All the rebates received on the coal delivered during the four months will be credited to this account. A debit entry will also be made for the 5 p.ct. expenses; and the balance remaining will be carried forward to next quarter, in accordance with "Instruction No. 3." This procedure is, I think, perfectly simple, and literally and exactly complies with the "Instructions."

Though the Coal Prices Order may be an ill-conceived and unwelcome measure, which will give a good deal of trouble to gas officials, no good purpose can be served by magnifying its difficulties. It is our duty to carry out the "Instructions," and though these may appear somewhat puzzling at first sight, more careful study will show them to be quite clear and unambiguous.

A. S. CAMPBELL, Secretary.

Wellingborough Gas Company, Jan. 14, 1920.

P.S.—The following simple rule may be found convenient for ascertaining the exact amount of the allowance to be made: Divide 114 pence (95 p.ct. of 10s.) by the number of thousand cubic feet of gas sold per ton of coal in the prescribed quarter.

[EDITORIAL NOTE.]

[Seeing that the criticism of the "Instructions" that has appeared in the last two issues of the "JOURNAL" was directed not so much to the interpretation of their wording as to the construction of their basis, and to the difficulty of discrimination between industrial and domestic use in areas of supply larger and denser, and in which use is more varied, than is the case at Wellingborough, we are gratified that Mr. Campbell has found nothing more to criticize than he has done. The "Instructions" have, of course, to be carried out, despite the difficulties they entail not only upon gas officials, but we hear upon colliery officials as well. As to interpretation, it is interesting to read Mr. Campbell's view that "although these [the Instructions] may appear somewhat puzzling at first sight, more careful study will show them to be quite clear and unambiguous." Now they cannot be "quite clear and unambiguous" if they require "careful study" to realize their meaning, and "appear somewhat puzzling at first sight." If they were "quite clear and unambiguous," the meaning would be apparent at first sight, and not puzzling. Mr. Campbell calls attention to a typical example of what Sir Arthur Quiller-Couch calls "jargon." Regarding this "typical example"—the second part of Clause 2 of the Instructions—what it says may not be what was the intention as to its meaning; and we are not altogether disposed to accept Mr. Campbell's interpretation of it without official confirmation, because a subsequently issued "Prescription" rather intensifies the words used in the first "Instructions," and adds to the confusion as to meaning. The original "Instructions" distinctly say: "The first allowance in the case of ordinary consumers shall be made in respect of the gas consumed during the first quarter of 1920 . . . and shall take account of rebates received or to be received on coal delivered between Dec. 1, 1919, and March 31, 1920." Our reading of this is that the words "take account" should be construed to mean "include." The first allowance "shall be made," and shall "take account." It does not say the undertakers "shall take account." That they will do so not only in respect of the coal delivered between Dec. 1, 1919, and March 31, 1920, but for all time that this arrangement continues, goes without saying; but the "Instructions" say nothing about "taking account" of rebates after March 31. This being so, it appears that the taking account of rebates for this defined period was intended to have something to do with the "first allowance," with an emphasis on the "first." The first "Instructions" were dated Dec. 24. In a "Prescription" issued by the Controller of Mines, dated Dec. 31 (see our "Miscellaneous News" columns), it is provided:

> The first allowance in the case of ordinary consumers shall be given to the consumers at the end of the first quarter of 1920 (and in the case of automatic consumers during, or at the end of, the quarter as may be suitably arranged), and *shall take account of deductions then actually made from the price of coal delivered between Dec.* 1, 1919, and *March* 31, 1920.

"Then actually made." We are not going to attempt to definitely interpret this. We will leave that to Mr. Campbell and to our correspondent whose letter succeeds this, and who, in this particular matter, does not apparently agree entirely with Mr. Campbell or with us. But perhaps the simple construction to be placed upon the words is that an allowance for four months is intended at the end of this quarter (calculated as prescribed) and adjustment made in the rebate for the second quarter. But anyway there will be muddled accounts for many undertakings, seeing how much one quarter varies from another in regard to factors that come into operation—such as variations in the quantities of coal delivered, variations in the quantities of coal used from stock, variations in water gas made, and variations in gas produced per ton. There is not a great deal in the criticism that precedes this point in Mr. Campbell's letter. The fact that it does not matter whether total tons are divided by total gas, or domestic tons by domestic gas (as the percentage for the domestic coal and gas is the same) in determining the allowance, reduces this point to one of small importance. If no heed is to be paid to the second clause of the "Instructions" or "Prescription" referring to the "first" allowance, save that an account is to be kept of the rebates or deductions up to March 31, then part of our reference to the Commercial Gas Company would have to be cancelled.—ED. G.J.]

OTHER VIEWS ON THE SUBJECT.

SIR,—An editorial under the heading "Calculating the First Allowance" in the current issue of the "JOURNAL" is my excuse for writing to you with regard to the recent Coal Mines Order.

The two paragraphs of Clause 2 of the "Instruction to Gas Undertakings" appear to be somewhat conflicting; but I think that they can be so read as to avoid difficulty in giving effect to the Instruction.

The first paragraph of this clause appears to me to be, in effect, a formula for ascertaining in terms of pence per 1000 c.ft. the equivalent of 10s. per ton of coal; and for this purpose all that is necessary is to divide the total quantity of gas sold during a quarter by the amount of coal carbonized during the same period. Assuming that this amounts to 15,000 c.ft. of gas, this figure, divided into 120 pence, will give 8d. per 1000 c.ft.

The question of what proportion of the total sum is "domestic" does not really arise in making this calculation, because the percentage of the gas sold for domestic purposes would have to be divided by the same percentage of coal, to arrive at a mathematical equivalent.

It will be seen that the first allowance is in respect of gas consumed in the current quarter only. This provision seems desirable for two reasons: (1) That the amount of gas consumed in the month of December is unknown; and (2) that for the purposes of providing funds to meet the three months' allowance to consumers, the undertaking is in receipt of *four* months' deductions from their coal accounts.

The second paragraph of Clause 2 has caused some confusion by reason of the words "shall take account of." To my mind, this means merely that the sums received from Dec. 1 to March 31 shall all be available for purposes of rebate to consumers, but certainly does not mean that the four months' deductions should all be distributed at the end of the first quarter, because such an arrangement would be directly opposed to the spirit of the previous paragraph.

The word "previous" twice used in the first paragraph of Clause 2 has given rise to some misunderstanding. From a reading of the formula, it is evident that the amount of the allowance cannot be arrived at until the quarter for which the allowance is being calculated has actually expired. Consequently, at the time when the allowance is being calculated, the quarter to which it refers having already elapsed, must be referred to as the "previous" quarter.

Briefly, the allowance for the quarter in which we now are cannot be definitely known until early in April, by which time the quarter we are now in must be referred to as the "previous" quarter.

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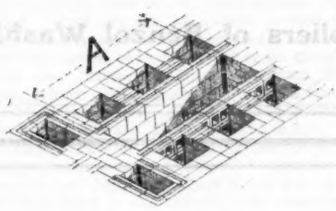

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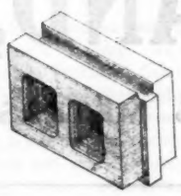

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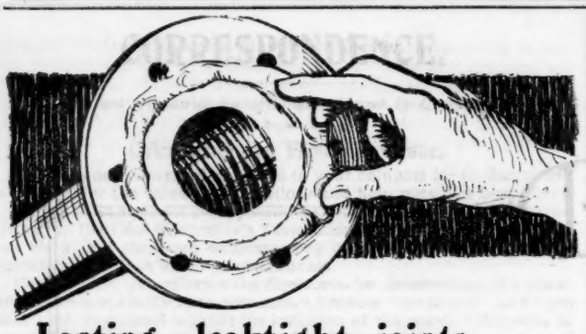

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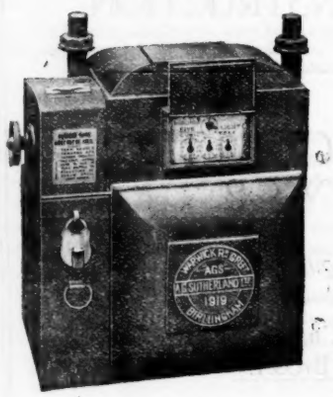


5-Lt. Prepayment.

FINEST MATERIAL. BEST WORKMANSHIP.

5-LT. PREPAYMENT METER

Range 6 ft. to 34 ft.
Price changed in situ.
Without change wheels.
Cannot be pumped.
Absolutely positive.

WARWICK ROAD, GREET, BIRMINGHAM

The "B.C.G.A." Sales Development Scheme.

SIR,—Congratulations on your "Editorial" of Jan. 6. To one interested in the commercial side of the gas industry rather than in the manufacturing and engineering branches, your writing with regard to the need for adequate planning to meet the competition of the future is of particular interest.

As you know, the department which I represent in the British Commercial Gas Association is responsible for a Sales Development Scheme which over sixty managers and engineers are supporting. But though some are progressive, it is my experience that, even in these days, the industry is much more concerned with the retort-house than it is with the sales department. At the moment this may not have a very serious effect, because most undertakings are able to report from 5 to 20 p.ct. increase of business—all they can cope with.

In view of the fact that the industry can increase its output threefold, before it reaches anything like saturation, it seems to me that it is time we recognized that 5 p.ct. to 20 p.ct. increase on merely one-third of our possible business is not very much to congratulate ourselves upon. We need to cultivate a sense of proportion; otherwise the industry will find itself in this position: Its competitors vying for the third of the business already secured, and taking from us the two-thirds which remain unexploited—unattacked by ourselves.

The value of the Sales Organization Scheme which the British Commercial Gas Association have formulated lies, according to a progressive manager, in this fact, "It shows what a large unsuspected, unexploited field still remains within an undertaking's boundary."

The scheme brings into the office a record of all selling possibilities existent on a "gas area." With such a record, a gas undertaking can know its possibilities, and attack them little by little until the whole have been filled.

Efficiency in manufacture *plus* efficiency in salesmanship equals maximum prosperity; and the one is equally as important as the other.

F. H. HOLLAND, Director,
Sales Organization, British Commercial Gas Association.

30, *Grosvenor Gardens, S.W., Jan.* 13, 1920.

Where is the National Association of Technical Gas Officials?

SIR,—In reply to the above question by your correspondent "Jutland," since the 14th inst. the office of the Association has been at No. 109, Exchange Buildings, New Street, Birmingham, where a Secretary is now installed. Members will be shortly invited to meet and elect the necessary Committees and Executive. Until these are formed, the Association can be of little service to its members.

In your comment on "Jutland's" letter, you state that as many officials are well paid, there does not appear to be a consistent need for such an organization as the "N.A.T.G.O." Many officials are well paid without doubt; but there are far more who are not.

I think it will be found that the greater proportion of advertisements for engineers or managers that have appeared within the last year or so have offered salaries very little in advance of pre-war figures, which, in view of the fact that there is not the slightest indication that the value of money will increase in the near future, is a clear justification for the formation of the Association.

X.

Jan. 17, 1920.

[We are, and it is hoped that many readers will also be, pleased to have the answer to "Jutland's" inquiry. As seen above, the office of the National Association of Technical Gas Officials is at No. 109, Exchange Buildings, New Street, Birmingham; and to that address all gas officials interested in the movement should send their communications. There is one point in the second paragraph of the letter of "X" which does not exactly represent what we said on p. 69 of last week's issue. What we wrote was: "The matter only seems to crop up by fits and starts; and we rather think this is due to the fact that a consistent need for such an organization does not exist in the gas industry. Many officials who are well paid, and so comfortably situated, take only a distant interest in a movement to elevate the material positions of less fortunate colleagues, who are left to struggle alone as best they may." This will put the matter right so far as we are concerned; for the movement, as our columns have frequently shown, has our sincere sympathy.—ED. G J.]

Society of Technical Gas Officials.

SIR,—Presumably, the Society of Technical Gas Officials is just now hibernating?

How numerous have been our complaints as to the apathy and indifference of Government Departments! But it would appear that we have been living in glass houses. I hope "Jutland" has bent one of the panes.

Cannot we have a meeting to pass a vote of sympathy with the directors of a gas company who can afford to pay for the managing of their works only 30s. per million c.ft. of gas made?

I am at a 100 million works, and am paid £4 10s. per million c.ft. gas made. But, like "Jutland," I would like to help those who stand in need.

"NALGONIAN."

Jan. 15, 1920.

Crude Ammoniacal Liquor for Agriculture.

SIR,—Perhaps the best answer I can give to Mr. A. O. Blackhurst is to cite a case in which, over forty years ago, I took personal interest and still remember.

A plot of land was in the fall of the year treated with "gas-water" taken from a subsidence tank where it had been exposed for months, and to which was added thrice its bulk of water. An adjoining plot was dressed liberally with stable manure. After lying all the winter both plots were planted with potatoes, which grew healthily, and in due time the crop was lifted. The first named had no sign of disease. The second, however, was not so fortunate—some of the tubers proving unfit for table use through disease, and together with the haulm were destroyed by the agency of fire. On this experience, my belief is founded.

It is well worth while to ascertain by simple systematic scientific tests the power of crude ammoniacal liquor to eradicate potato disease, "'Tis a consummation devoutly to be wished!"

The writer may add that the question of the efficiency of the liquid used in spraying is not raised, and no disparagement to the undisputable claims of sulphate of ammonia as one of the best fertilizers at the command and service of agriculturists, intended.

CHARLEYMANGE.

Jan. 16, 1920.

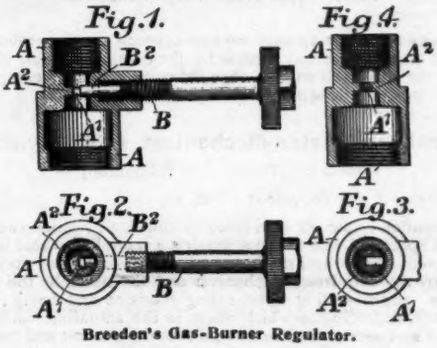
REGISTER OF PATENTS.

Regulators for Gas-Burners.—No. 135,653.

JOSEPH BREEDEN & CO., LTD., and BREEDEN, J., of Birmingham.

No. 20,701; Dec. 12, 1918.

The inventors provide between the gas inlet and outlet ends of the regulator of the burner a plain disc-like diaphragm having in it a crossing slot, extending nearly from side to side of it. The opposite edges of the slot are concave, and are continuations of the sides of a transverse hole in the body of the valve, the axis of which hole is in the same plane as the middle of the diaphragm. The outer end of the plain hole terminates in a larger internally screwed hole, as shown.



Breeden's Gas-Burner Regulator.

Fig. 1 is a vertical section of the regulator for an incandescent burner. Fig. 2 is a plan, and fig. 3 is a similar plan view but with the screw pin or regulator proper removed. Fig. 4 is a vertical section.

A is the body of the valve and A^2 is the slotted diaphragm near the middle of the body—the slot being marked A^1. The opposite edges of the slot are concave, as seen by Fig. 4. In one side of the valve body is a hole for the screw pin or regulator proper B; the pin having on its front end a plain or unscrewed part B^2, which passes through, and works in, a hole the axis of which is coincident with the axis of the curved edges of the crossing slot A^1 in the diaphragm. By screwing home the regulating screw pin the slot in the diaphragm is completely closed; and by unscrewing it the slot can be opened to any extent desired. Thus, in all positions of the screw pin, when partially unscrewed a clear rectangular passage approximately in the axis of the regulator body is obtained, which passage, however small, is always clear for the gas.

Coin-Freed Meter Mechanism.—No. 135,966.

GLOVER, THOMAS, of Edmonton.

No. 20,720; Dec. 12, 1918.

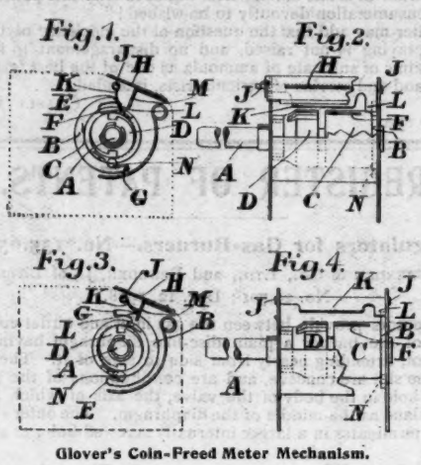
This invention relates to coin receivers (employed in coin-freed meters) formed from two cups having slots for receiving the coin—one cup being fixed to the axle of the operating handle and the other cup loosely positioned thereon and connected to the operating mechanism. The object of the invention is to provide means whereby the coin slot is only open when the two cups are in proper position to receive the coin and closed during the whole of the movement of the cups—thereby "preventing any fraudulent tampering with the cup or cups to operate the mechanism."

Fig. 1 [p. 140] is a side elevation of the coin receiver ready to receive a coin—the coin-slot in the casing being open. Fig. 2 is a front elevation of fig. 1, showing a casing to which the coin receivers are connected. Fig. 3 is a similar view, but showing the coin receivers at the discharge position and the coin-slot in the casing closed. Fig. 4 is a front elevation of fig. 3.

The axle A is provided with the segment of a disc, or it may be a strip B connected to one of the cups C—the disc segment or strip being of larger diameter than the cups C D. One end E of the strip B is positioned near the coin slot F in the cup C, and the other end G somewhat diametrically opposite. Between the coin opening H of the casing and the coin-slot of the carrier there is pivoted a shaft J carrying a strip K of such a size and shape as to cover the coin slot; the shaft also carrying a flag or wiper L, which is acted upon by the edge of the disc strip B.

In normal condition, and when the carrier is in position for receiving the coin as in fig. 1, the strip K and wiper L hang down clear of the coin opening H, leaving it free; but so soon as the coin carrier C

D is turned, the end of the disc strip B acts upon the wiper, and moves the shaft J for the strip to close the coin opening in the casing, and the wiper rides along the edge of the disc strip B for the whole movement of the carrier in both directions—*i.e.*, until the carrier C D has completed its movement and been returned. Then, just as the carrier is repositioned, ready for receiving a fresh coin, the strip K and wiper L drops or is returned by a spring, and the coin opening in the casing is opened.



Glover's Coin-Freed Meter Mechanism.

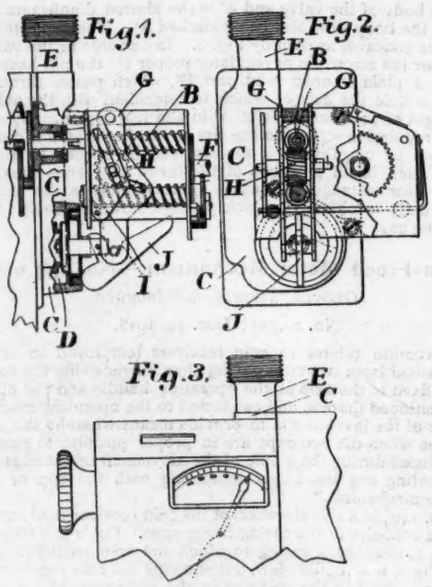
The inside of the casing next the coin opening may be provided with a ledge M or tube to act as a guide for the coin, and a stop N is provided for the strip B to engage when the coin carrier has completed its movement in either direction.

Coin-Freed Meter Mechanism.—No. 135,967.

GLOVER, THOMAS, of Edmonton.

No. 20,721; Dec. 12, 1918.

This invention relates to coin-freed mechanism in which two worms positioned apart and at a distance (having a travelling wheel between) are employed—such wheel meshing with each worm; one worm being operated by the coin-freed mechanism and the other by the vending mechanism—the travelling wheel riding over one and being revolved by the other, according to which worm is the actuating worm. The object is to so operate the mechanism that the gearing and coin-freed part can be readily removed and the meter used as an ordinary meter on the application of a screw plug or other closing device at the valve aperture, or the gearing and coin-freed mechanism can be removed for repairs without disturbing the meter itself.



Glover's Coin-Freed Meter Mechanism.

Fig. 1 is a part sectional rear elevation of the mechanism as applied to a meter—part of the meter casing only being shown. Fig. 2 is a part sectional side elevation showing the valve casing. Fig. 3 is a front view of a portion of the meter and mechanism casings and showing the index of the coin-operated mechanism.

The rod A connecting the gas-operated mechanism and for connection to a worm B is inside the meter, and its end projects through a stuffing box in a casting C forming the outlet; or, as shown in the engraving, the rod A can be connected by suitable gearing to a rod within the stuffing-box. The casting carries a valve seating leading from the outlet of the meter and also an opening D to the outlet pipe E—the casting being secured to the meter body and provided with means whereby the gearing and coin-freed mechanism frame can be readily attached.

The worm gearing and valve, and its operating mechanism, as well as the coin-freed mechanism (which may consist of the two usual slotted cups on the shaft F connected by a train of wheels with the worm), are contained within a casing; and to the frame carrying the gearing are pivoted levers G, each having a right-angled slot in it; these levers hanging one on each side of the worms—the right-angled slots carrying the axle of the travelling wheel H so that the wheel will move the levers at each end of its travel along the worms.

In action, one worm is operated by the coin-freed mechanism as usual. It meshes with the travelling toothed wheel H, and causes it to move along and walk-over the worm B, carrying the levers with it until the wheel H reaches the end of the journey determined—the pointer showing the amount of gas to be consumed for the coin inserted. At the commencement of the journey the levers were in one position; the pointer indicating zero with the pin or bar of the levers engaging the recess I, and having forced the valve to the closed position as shown. During this movement of the wheel H the pin or bar of the levers has, by action in the recess, caused the lever J to rock about its pivot the back end of the arm acting as a fulcrum against the valve cap so as to open the valve, after which the bar on the levers leaves the recess I and travels along the straight race of the pawl lever J. The gas now starts flowing under the action of the meter mechanism, and the other worm B is revolved by the mechanism; the wheel H being returned by the worm.

Purifying Gas and Obtaining Bye-Products.

No. 135,931.

UMSTED, F. A., of Chicago, U.S.A.

No. 20,002; Dec. 3, 1918.

According to this invention, the gas is purified by treating it, while under a continuous flow, successively through a series of contiguous chambers arranged to form a complete apparatus to two distinct series of processes.

The first of the series comprises fractional cooling processes of the kind wherein the cooling fluid does not come into contact with the gas under treatment, in order to remove the heavy constituents in successive stages. The second of the series comprises direct-contact processes, wherein the gas is subjected successively to the action of various materials selected according to the ingredients to be removed—preferably the gas being submitted first to the action of water-condensate materials to remove moisture; then to the influence of contact with dry oxide of iron and sawdust, for the purpose of removing other ingredients; then to lime and charcoal, to remove sulphur and kindred products; then to oxide of iron, for removing the remaining cyanogen gas and sulphur; and, finally, to lime and coke to remove the remaining naphthalene, heavy benzol, and kindred products.

The apparatus is preferably provided with means whereby the desired different temperature of each stage in the non-contact cooling processes is maintained automatically.

In the fractional cooling stages, use is made of a type of apparatus wherein a cooling fluid is passed by a common inlet and outlet through a series of tubes passing through a chamber through which the gas under treatment flows. In known methods of gas purification it has been suggested to use materials similar to those here described for removing certain ingredients from the gas. The successive application, however, of these filtering and purifying means, as specifically pointed out, has not been suggested—so it is asserted.

The primary object of the invention is the provision of a method for purifying gases generated from suitable materials, as coal or oil, and particularly for gases obtained from the dry distillation of waste materials like garbage, manure, street sweepings, municipal waste, peat, sawdust, waste wood, wood stumps, lignite, low-grade sulphurous coals, &c.—in fact, any animal or vegetable substances containing sufficient moisture base to give off gas upon the application of heat.

Gas-Burner for Heating Baking Ovens.—No. 136,184.

LAUNHARDT, G., of Essen-Ruhr, Germany.

No. 8851; June 20, 1917.

The principal feature of this invention consists in the combination of a mixing tube, a burner-head narrowed shortly behind its outlet openings and flattened for about one-third of its length at the portion adjacent to the mixing tube, and outlet openings arranged at obtuse angles to one another on the burner-head.

In order to ensure a favourable distribution of the gas (even with very large burners) the mixing tube is fitted, at the point where it joins the burner-head, with easily adjustable vanes, in the form of venetian blinds, whereby an even distribution of the gas towards the sides of the burner is ensured—it being further possible to supply a large quantity to one side of the burner than to the other side if this should be required.

Combustion of Fuel.—No. 136,212.

DELLWIK, C., of Chorley Wood, Herts, and TECHNO-CHEMICAL LABORATORIES, LTD., of Clapham Park, S.W.

No. 18,392; Nov. 9, 1918.

This invention relates to combustion of atomized fuel, in the form of powder carried by a gaseous medium into a combustion chamber to combine with a further volume of air (or its equivalent) that has been preheated by the waste heat, and according to which the volume that is preheated is so reduced that its temperature is raised above the ignition temperature of the fuel by the waste heat, while a reducing atmosphere is assured by restricting the carbon dioxide to an amount not exceeding the carbon monoxide in the gases leaving the working or heating chamber.

Distillation of Solid Carbonaceous Material.

No. 136,585.

BURNEY, C. D., of Wilton Crescent, Belgrave Square, S.W.

No. 14,176; Aug. 31, 1918; No. 19,177; Nov. 21, 1918.

In the distillation of solid carbonaceous or oil bearing material such as coal, cannel coal, torbanites, lignite, shale, peat, &c., for the purpose of obtaining the hydrocarbon oils therefrom at low or moderate distillation temperatures, it is essential (the patentee points out) that the heat should be applied as directly as possible, and should not have to pass through any substantial mass of metal such as is the case when the retort is heated externally. Neither is it satisfactory to pass the heating gases through the interior of the retort, as this method is wasteful of heat owing to the fact that the gases mainly pass over (and not through) the material, so that only a relatively small proportion of any given volume of heating gases as they pass through the retort comes into actual contact with the material undergoing distillation. Furthermore, this method is open to the objection that the heating gases mix with the volatile products of distillation and require to be subsequently separated from them. The main supply of gases for heating the material are generated in a combustion chamber at one end of the retort, and are drawn from the chamber into hollow elements within the retort which serve both to distribute heat indirectly to all parts of the material undergoing distillation and also to move the material progressively through the retort. To this end the hot gases may be passed from end to end of the retort by a screw conveyor of the kind having a hollow screw-thread which acts as a passage for the heating gases. Means (such as baffles) may be associated with the screw thread for causing the hot gases on their way to the outlet end of the conveyor to flow between the screw threads, which are thus directly heated throughout. The gases may be supplied under pressure from an external furnace or combustion chamber, or they may be drawn therefrom through the hollow screw-thread of the conveyor by a fan. The material under treatment is thus divided into thin layers by the thread, and is separated from contact with the gases only by the relatively thin metal of the hollow screw thread, which may be formed upon a central hollow conveyor tube through which the gases can be introduced at one or more points.

The exhaust gases, after they have passed through the conveyor, are preferably employed to heat the combustible gas and/or air as they pass to the burners, for which purpose the conveyor tube at the outlet end of the retort may open through suitable apertures into a flue extending along the floor or walls of the retort, through which flue the air and/or gas supply pipes pass, or the air for primary and secondary combustion may pass through a regenerator associated with the furnace or combustion chamber; the gas employed preferably consisting wholly or in part of the uncondensable products of distillation.

The apparatus for which the invention is said to be more particularly intended—although also applicable to vertical or inclined retorts—is one in which the carbonaceous material enters a horizontal or nearly horizontal retort at one end, where the temperature is comparatively low, and passes to the other end through zones of increasing temperature; the burners and combustion chamber for the supply of the heated gases being placed at the outlet end of the retort, from which the material, after distillation and in the form of coke, is removed. As it is desirable to regulate the temperature at different points of the retort, small auxiliary tubes are led from the combustion chamber through the conveyor tube and opening at any suitable point in the conveyor tube, so as to give an auxiliary heat supply and prevent the temperature gradient becoming too steep at any point. By these auxiliary heat supply tubes, which take off high temperature gases from the combustion chamber and lead them directly to points along the length of the conveyor, the temperature gradient is readily adjustable according to the nature of the material under treatment.

Alternatively the temperature gradient can be controlled either by regulating the pressure of the gases supplied to the screw thread of the conveyor or by varying the speed at which they are drawn through it by means of a power-driven fan.

Heretofore, in continuous methods of treating carbonaceous materials, the diameter (and consequently the internal capacity) of the retort has necessarily been limited by the inefficient nature of the means employed for heating the retort. Moreover, it has only been possible to feed the material through the retort comparatively slowly, so that the actual volume of the material treated in a given time has been comparatively small. By the present improvements, however, the diameter of the retort, and the mechanical means employed for feeding the material through it, can be as large as desired; and as the quantity of material which can be treated in the retort is consequently increased, the separation and collection of the volatile products of distillation given off at different regions of the retort chamber becomes an important matter. Accordingly, these products may be removed separately from the retort at different points along its length and led away without admixture with each other to separate condensing chambers, where the gases are condensed into liquids having different properties according to the temperature and place at which they were given off and collected in the retort. In this manner the liquid products of condensation can be collected from the separate condenser chambers and disposed of according to the specific gravity of the several liquids for further fractional re-distillation.

As it is desirable to break up the material as it passes through the retort, in order to prevent clogging and the accumulation of material at the lower side, projections are provided on the screw thread at suitable intervals apart, which tend to carry the material to the upper side of the retort and allow it to fall so as to ensure that it does not accumulate in large masses. Or the material as it passes through the retort may be broken up by a scraper in the form of an archimedean screw the helices of which rotate within, and are of the same pitch as, the helices of the screw conveyor. It may be constituted by a continuous helical plate or surface cut radially at intervals and twisted in opposite directions (or otherwise formed with projections), so that the plate and the projections dislodge the material from the helices of the screw conveyor, while at the same time assisting in feeding it forward to the upper side of the retort.

LEGAL INTELLIGENCE.

DUNDALK GAS COMPANY'S VALUATION.

As was intimated in last week's issue of the "JOURNAL," at a recent sitting of the Dundalk Quarter Sessions, the Urban District Council appealed against the decision of the Commissioner of Valuation in respect of the Dundalk Gas Company's mains, service-pipes, and easements over ground occupied by same, holding that a reduction from £300 to £120 was unreasonable.

Mr. LARDNER appeared for the Council; Mr. C. S. CAMPBELL, for the Gas Company; and Mr. M'Elligot, K.C., for the Commissioners of Valuation.

Mr. LARDNER, in opening the case, said it was an appeal by the Dundalk Council in respect of a revision of the valuation for the year 1919. He would simplify the issue, because they would not require the whole figures of the concern, but only one particular set. Up to the year 1915, the valuation placed upon the Company's property was as follows: Gas-works and manager's residence, £500; land occupied by gas-mains and service-pipes, £570—making a total of £1070. In the month of October, 1919, there were two appeals by the Company and the electric light undertaking, which terminated in a way not as some of them would have wished. The figures upon the gas-works and manager's residence remained at £500; but the Court reduced the rating on the gas-mains and service-pipes from £570 to £300. This continued until last year, when the Company applied to the Commissioners of Valuation for revision, with the result that the assessment upon the gas-mains and service-pipes was reduced from £300 to £120. Subsequently there was an appeal to the Commissioner himself; and it was confirmed at £120. As a result, they were there appealing against the Commissioner's valuation in respect of the assessment on gas-mains and pipes. The entire discussion would therefore centre round the £120. The Council held that the valuation of £120 was too low, and did not represent the annual value; that the reduction from £300 to £120 was unreasonable, and the valuation ought to be left at the original sum; and that the letting value of the ground was highly in excess of the valuation of £120. In valuations of this kind, matters were decided under two heads—landlord's capital improvements and tenant's capital improvements. They asked the Company by letter to give them particulars of new slot-meters and gas-cookers that were put in; and they refused all information. The practice of the Company in recent years was to push installations of gas-cookers and slot-meters, and to take advantage of all new developments in gas. They came to the conclusion that the Company were putting in these things out of revenue, and were not charging them to capital account. It had been decided in the Ipswich case that slot-meters, and things of that kind, should be rated as tenant's improvements. Therefore the first point he raised was that the Company were paying out of revenue for slot-meters, cookers, gas-fires, and things like that, and not charging them to capital; and that these had been held to be tenant's capital, and ought to be rated as between the hypothetical landlord and the hypothetical tenant. Further, they held that the Commissioner had been deceived—he would not say wilfully. They held that a wrong period was discussed as a basis of assessment, in taking an average for three years to March 31, 1918, and that the previous year should be taken. Finally, they contended that the amount to make relative with other valuations could not be justified in the case of a gas company, where there was only one of its kind. Counsel referred to the dividends paid by the Company, and added that there was no doubt there had been most extraordinary development on the part of the Company; and they were to be congratulated on this.

Mr. *H. Mortimer Carpenter* (of Messrs. Humphreys Davies & Co., Ltd., of London), was called as an expert witness on valuation on behalf of the Council. He had prepared and drawn up a report in connection with the Company, and had gone into the revenue accounts of the Company from 1914 to 1918. The Commissioner of Valuation had taken an average of three years; but the correct way was to take it from the year previous to the valuation. The profit of the Company each year was £2000, with the exception of one, when it was £1500; but he did not think this should be taken into account, considering that the undertaking was on the up-grade, and not likely to have a bad year like that again. He disallowed one-half of the Directors' fees; and after dealing with the various allowances, he valued the mains and pipes at £466.

Mr. CAMPBELL (in cross-examination): I suppose the principle you go on in assessing a valuation of this kind is what a reasonable tenant would be likely to pay for the concern.

Witness: Yes.

I put it to you that a tenant going in to take over a concern of this kind would have regard to what the earnings of it were for the past four years?—Only as throwing light on the future.

If the concern had been an improving concern up to the time that a rival establishment had been built-up, and from the time that the rival concern started it had been "disimproving," would this affect a tenant seriously?—It would have to be taken into consideration.

Had you a look at the books of the Company prior to 1911?—No.

Were you aware that an electric light station was built by the Council in 1911?—I do not know the year.

Assuming that the fall in the actual sale of gas since 1911 had been 36 p.ct., would you think that this would affect the tenant?—I think he would look at the money first.

Do you think it would affect the amount to be paid by a possible tenant if customers had been dropping off yearly and taking electric light?—It might, to look at the accounts.

Mr. CAMPBELL said everybody in Dundalk knew that the Gas Company were failing since the electric light concern had been established. Since electricity had been introduced, the Gas Company had lost the Railway Company (one of their biggest consumers), the Steampacket Company, the distillery, and also the most important part of their revenue—street lighting. Far from being an improving concern, it

was getting worse and worse; and when Mr. Carpenter said it was improving in 1918, it was really due to this—that, as all gas companies were coming to the end of their financial tether, the Government had to step in and give them a temporary right to increase their charges. This Temporary Act would come to an end, and was not a matter on which a valuation should be fixed. The electricity undertaking of the Council, which was an improving concern (inasmuch as it was taking from the Gas Company most of their best customers) was actually valued at £440, as against £620 for the Gas Company—and this although the capital of the electricity undertaking was much higher than the Gas Company, being nearly £50,000, as against £22,000. On the same basis as Belfast, the valuation of the Company would be well under £300. In the gas concerns of Newry and Drogheda they were valued at much less than in Dundalk; and he suggested that his Honour should not interfere with the discretion of the Valuation Office.

Mr. M'ELLIGOT said the principle adopted in this particular case by the Valuation Office had been that invariably adopted by them in valuations throughout Ireland, with the exception of one deviation, which was really in favour of the appellants. There was no allowance made in respect of sinking fund for the renewal of plant and buildings. In this case, such a large sum was deducted from revenue in respect of maintenance and repairs that the Commissioner did not think it right to make any allowance in respect of sinking fund. The valuation was based on the three-year period, which was received with favour in any Court in Ireland.

Mr. *Cauldwell*, examined on behalf of the Company, said that in his opinion a prudent tenant would pay £283 5s. 4d. a year for the gas-works.

Mr. *George Airth* (Manager of the gas-works) gave evidence that in 1911 they had an output of 54 million c.ft. The receipts amounted to £2748. In that year they paid 10 p.ct. on the "A" shares and 7 p.ct. on the "B" shares. In 1918 their receipts were £1841; and they paid 5 p.ct. on the "A" shares, and 3½ p.ct. on the "B" shares. They two years ago obtained permission to instal cookers in the Urban Council houses; but they had only installed four. These cookers were given at cost price, and were maintained out of revenue, because they had to maintain them, and were allowed no depreciation whatever. In 1911 they received from the Railway Company £1313 12s. 8d. Last year they only received £179 14s. 4d., though they were now charging 6s. 3d. per 1000 c.ft., as compared with 3s. 9d. in 1911. When he came to Dundalk eighteen years ago, they had nine cookers, and to-day they had 574. At the present time these cost £3 17s. each, if they could get them. They had now 920 slot consumers; and in 1918 they received £3648 from them. The capital was made up as follows: Buildings and plant, £10,990 approximately; mains and services, £6250; meters and cookers, £4706. They had in the last ten years put in 150 cookers.

Mr. LARDNER asked whether the price of gas had not been reduced.

Witness said the Board of Trade had compelled them to reduce the prices down to the extent of the allowance off coal.

Mr. LARDNER, in the course of his remarks, said Mr. Airth had given his evidence fairly, and as Manager of the Gas Company he had conducted the undertaking in a manner of which Dundalk ought to be proud.

His HONOUR concurred. He increased the valuation by £65, making it £185 on the mains, &c.

Mr. M'ELLIGOT said he would ask for a ruling in a Higher Court, as the Commissioners were not satisfied with the decision.

Prepayment Meter Dispute at Devizes.

A disputed gas account formed the subject of a lengthy hearing at the Devizes Borough Petty Sessions; the Corporation Gas Committee claiming £2 2s. 4d. from Mr. Walter Wiltshire for gas consumed through a prepayment meter between March 25 and July 17. Owing to the mechanism having become faulty, gas could be consumed without money being put in the meter, which, however, continued to register. Mrs. Wiltshire, who appeared for her husband, said she was willing to pay for the gas consumed in the period during which the slot arrangement was known to be wrong, but was not prepared to pay the full amount demanded. Mr. J. Compton (for the Gas Committee) said the case was brought under the Gas-Works Clauses Act, 1871, which laid it down that the register of the meter should be regarded as *primâ facie* evidence of the amount of gas consumed. On June 17 an official called to read the meter; and the prepayment apparatus was then found to be out of order. The previous reading was on March 25. On June 17 the register showed that 9200 c.ft. of gas had been consumed, which represented £2 5s. 3d.; but the coin receptacle only contained £1 0s. 8d. So that the Committee were losing £1 4s. 7d. On July 16 a new meter was put in; but by this time a further amount of 3600 c.ft. of gas, representing 17s. 9d., had been consumed. This made an amount of £2 2s. 4d. due, after giving credit for the £1 0s. 8d. found in the meter. It was for the Bench to decide whether there was anything wrong with the meter. Evidence was given by Mr. W. J. Rendell Baker (Gas Engineer, Manager, and Secretary to the Devizes Corporation) and other witnesses; and, on the other side, Mrs. Baker said her contention was that in regard to a prepayment meter the Committee could not make a claim. Beyond this the charge was an excessive one. Mr. Compton pointed out that prepayment consumers generally had an agreement; but there was not one in this case—the meter having been installed before Mr. Baker's arrival. The Bench decided that defendant must pay for the gas registered; but they refused to allow costs, on the ground that the Committee should have had a signed agreement.

Reduced Gas Prices at Radcliffe.—The Radcliffe Gas Company, who cover Radcliffe, Prestwich, and Whitefield, announce that, at the commencement of next quarter, the users of gas for strictly household purposes will begin to benefit from the recent reduction in the price of coal for domestic use. The price of gas will not be actually reduced; but consumers will be granted a rebate at the end of each quarter, which will vary between 6d. and 8d. per 1000 c.ft.

MISCELLANEOUS NEWS.

GAS-WORKERS' WAGES AWARD.

An Increase Based on the Size of Undertakings.

The Industrial Court last week issued the following award with reference to the wages to be paid by federated gas undertakings in Great Britain and Ireland. The claim submitted was for a uniform advance. The representatives of employers contended at the hearing that, should an advance be granted, discrimination should be made between the larger and the smaller undertakings; the financial position of the latter being of special difficulty. The Court have upheld the principle of discrimination, and award to male workers aged 18 and over an advance of 5s., 4s., and 3s. a week, according to the output of the particular undertaking concerned.

PARTIES.

(1) National Federation of General Workers
and
(2) Federation of Gas Employers.

TERMS OF REFERENCE.

Application for the following increase of wages to general workers employed in connection with gas undertakings:

(1) 10s. a week or 1s. 8d. a day or shift for adults.
(2) 5s. a week or 10d. a day or shift for juniors.

THE AWARD.

1.—The matter was referred under the Industrial Courts Act, 1919, by the Minister of Labour to the Industrial Court for settlement; and representatives of the parties were heard in London on Dec. 22.

2.—In February, 1919, an advance of 5s. a week was awarded to men and women 18 years of age and over, and 2s. 6d. a week to youths and girls under 18 years of age, by the Court of Arbitration. This advance, operating over and above an advance awarded by the Committee on Production, and advances agreed to between the parties without recourse to arbitration, has resulted in a total nominal war advance of 28s. 6d. a week to male workers 18 years of age and over in most of the undertakings, for six days or six shifts, *plus* 12½ p.ct. on earnings in the case of male workers 21 years of age and over. Seven-shift men, accordingly, receive 28s. 6d., *plus* one-sixth of 28s. 6d., *plus* 12½ p.ct. on total earnings, for their full ordinary week. Piece-workers have received corresponding advances, except that they have received a bonus of 7½ per cent. on earnings, instead of 12½ p.ct. Since the date of the last award, an agreement was reached between the parties with respect to an alteration of hours. The hours of the yardmen were reduced to 47 per week, with no reduction in wages. In the case of the shift workers who were working 12-hour shifts, the length of the shifts was reduced to eight hours with no reduction in pay in most (if not all) cases. Shift workers who were on eight-hour shifts received an increase of 6d. per shift from May 1, 1919. It appeared from the evidence submitted at the hearing that extra pay has also been granted in certain cases for Sunday work. The effect of these changes is to yield in some cases an increase over pre-war rates considerably in excess of 28s. 6d. a week, *plus* 12½ p.ct. on earnings.

3.—It was intimated to the Court that the undertakings affected differ considerably in size, and are situated in England, Wales, Scotland, and Ireland.

4.—The evidence submitted showed that the war has had an adverse effect on many of the undertakings. The increase in the cost of material—raw and manufactured—and the rise in wages have produced a position of affairs not contemplated when the legislation regulating and controlling gas undertakings was passed. Even some of the large undertakings which, before the war, were carried on with financial success, now show deficits.

5.—Some of the gas undertakings are very small, producing only 9 million c.ft. of gas a year. It was submitted on behalf of the employers that in these cases an additional charge in respect of wages would result in further serious financial embarrassment. It was accordingly submitted that, should any advance be granted as a result of the present proceedings, those undertakings having a production of 120 million c.ft or more per annum should be differentiated from those with a less production, leaving it to the workpeople or the employers, as the case might be, to raise specially the case of any undertaking which on this basis of differentiation should fall into a category where, having regard to all the circumstances, the advance might be inequitable by reason either of excess or deficiency.

6.—The proposal was not accepted by the representatives of the workpeople, who contended that all the proceedings prior to those before the Court had been conducted on the basis that the claim was a national and general one against all undertakings alike.

7.—The Court have given careful consideration to the arguments addressed to them. They have in mind that the undertakings represented are for the most part statutory undertakings, and their products are in the main for purely local consumption, and that, for these and other reasons, their ability to meet increases in working expenses is limited. In the Court's view, it would be possible to discriminate between the various undertakings strictly on the basis of their capacity to meet the increased charges, only as the result of a review of the circumstances of each individual case, and after considering the whole question of the wages prevailing in the industry, and not merely of the war advances. Such an inquiry would not be practicable upon the present reference; and it becomes necessary, therefore, to consider whether any broad distinction between large and small undertakings should be recognized. In the view of the Court, the case for a distinction of this character has been made out.

8.—It is true that in their respective districts the undertakings represented are immune from competition in the supply of their chief product. But while in this sense a gas undertaking is a monopoly, it is a

monopoly under effective control. Most of the undertakings work under statutory restrictions as to price; and the difficulties of adjusting prices to meet increased costs of production have not been entirely removed by the Statutory Undertakings (Temporary Increase of Charges) Act, 1918. Moreover, the business of a gas undertaking is necessarily confined to the district in which it is situated, and economies cannot be sought by an entry into new markets. The probability of recourse to alternative forms of lighting, heating, and power as the price of gas increases must also be borne in mind.

9.—Where the wages paid in an industry are so low as to leave the workers without the means of an adequate and decent livelihood, the financial position of the employers is a matter of secondary importance. So far as the Court were informed, however, the wages paid in the gas industry are not of this character.

10.—After reviewing the merits of the claim, and having in mind the above considerations, the Court decide that advances shall be given to male workers aged 18 years and over as follows:

(*a*) When employed in undertakings which made not less than 100 million c.ft. of gas during the last completed working year prior to Jan. 1, 1920, an advance of 5s. a week, payable at the rate of 1od. a day or shift for each day or shift worked.

(*b*) When employed in undertakings which made over 50 million, but less than 100 million c.ft. of gas during the last completed working year prior to Jan. 1, 1920, an advance of 4s. a week, payable at the rate of 8d. a day or shift for each day or shift worked.

(*c*) When employed in undertakings which made not more than 50 million c.ft. of gas during the last completed working year prior to Jan. 1, 1920, an advance of 3s. a week, payable at the rate of 6d. a day or shift for each day or shift worked.

11.—The Court further decide that it shall be open to the representatives of the workpeople to bring forward any individual case of an undertaking covered by paragraph (*b*) or (*c*) of the preceding clause, where, in view of any special circumstances prevailing in such case, it is claimed that the amount of the advance should be that provided for a larger undertaking. In the Court's view, any such cases might properly be considered in the first instance by the Joint Industrial Council for the industry, on the understanding that, should a settlement not be arrived at, it shall be open to either party to refer the matter to the Industrial Court.

12.—The amounts hereby awarded are to be taken into account in the calculation of payment for overtime and night duty, and for work on Sundays and holidays, and will form part of the total earnings of time and piece workers upon which the bonuses of 12½ and 7½ p.ct. respectively, in cases in which such bonuses are payable, are to be calculated. But they are not otherwise to apply to or affect present time rates, premium bonus rates, or piece-work prices, and are not to be taken into account as part of the time rates for the purpose of fixing new piece-work prices or bonus rates.

13.—This award shall not apply to those cases in which it has been the practice to regulate the wages of the men concerned by the movements in the wages of men of a similar class employed in trades other than that of gas undertakings.

14.—In accordance with the agreement reached between the parties, the advances shall take effect as from the beginning of the first pay period following Dec. 1, 1919.

WILLIAM W. MACKENZIE,
J. M'KIE BRYCE,
D. C. CUMMINGS.

G. T. Reid, Secretary, 5, Old Palace Yard, S.W. 1
Jan. 12, 1920.

CALCULATING THE FIRST ALLOWANCE.

Prescription by the Coal Controller Issued Subsequently to the "Instructions."

In our "Correspondence" columns, there are letters and comments referring to the calculation of the first allowance to gas consumers under the 10s. rebate from coal used for domestic purposes. The "Instructions" issued to gas undertakings were dated Dec. 24; and on Dec. 31, the Coal Controller issued the following Prescription under the provisions of clause 5 of the Coal (Pit's Mouth) Prices Order and Direction, 1919:

Whereas under the provisions of clause 5 of the above-mentioned Order and Direction, it is provided (among other things) that, where coal is delivered to a gas undertaking, the owners or secretary or manager may, when paying therefor, give a certificate either to the colliery owner or to the factor, dealer, or merchant from whom they bought, that a proportion of the said coal has been, or will be, used by them for making gas for domestic or household purposes, and shall in that case be entitled to deduct 10s. per ton from the price in respect of such proportion, and that the Controller may prescribe the amount of coal in respect of which such deduction may be made as he, in his absolute discretion, thinks fit.

Now therefore the Controller hereby prescribes as follows:

(*a*) In the case of coal delivered during the month of December, 1919, the amount of coal in respect of which the said deduction of 10s. per ton may be made shall be ascertained by reference to the proportion that the quantity of gas supplied for domestic or household purposes during the third quarter of 1919 bears to the total quantity of gas supplied during the same period, and shall be determined and certified accordingly.

(*b*) In the case of coal delivered between the 1st of January, 1920, and the 31st of March, 1920, the amount of coal in respect of which the said deduction of 10s. per ton may be made shall be ascertained by reference to the proportion that the quantity of gas supplied for domestic or household purposes during the fourth quarter of 1919 bears to the total quantity of gas supplied during the same period, and shall be determined and certified accordingly.

(*c*) In any subsequent quarter, the amount of coal in respect of which the said deduction of 10s. per ton may be made shall be ascertained by reference to the proportion that the quantity of gas supplied for domestic or household purposes during the corresponding quarter of the previous year bears to the total quantity of gas supplied during the same period, and shall be determined and certified accordingly.

Provided always that in respect of sums so deducted, an allowance shall be made to each domestic or household consumer at the end of each quarter in the case of "ordinary" consumers, or during the quarter as may be conveniently arranged, in the case of "automatic" consumers, which shall be at that rate per 1000 c.ft. which results from dividing the total weight of coal (in tons) used in the previous quarter by the total number of thousands of cubic feet supplied in such previous quarter, multiplying the quotient by 120 (the result being in pence), less such percentage in respect of expenses as may from time to time be approved by the Controller of Coal Mines.

The first allowance in the case of "ordinary" consumers shall be given to the consumers at the end of the first quarter of 1920 (and in the case of "automatic" consumers during or at the end of the quarter as may be suitably arranged), and *shall take account of deductions then actually made from the price of coal delivered between the 1st of December, 1919, and the 31st of March, 1920.* Any surplus or deficiency shall be carried forward to the next quarter.

Dated the 31st day of December, 1919.

(Signed) A. R. DUNCAN, Controller of Coal Mines.

The "Iron and Coal Trades Review" says: "In order to assist the coalowners with their arduous duties, the merchants and gas and electricity works managers should send in their certificates for the December tonnage forthwith. Many merchants and others, no doubt, are still very much in the dark as to the exact interpretation of many of the Orders and instructions they have received, which, unquestionably, is causing much of the delay in sending in the December certificates."

PRIMITIVA GAS COMPANY.

Terms of the New Agreement with the Buenos Aires Municipality.

Dealing with the relations between the Primitiva Gas Company and the Municipality of Buenos Aires, the following appeared in the "City Notes" columns of "The Times" for Friday last:

The stage of finality has at last been reached in the long-drawn-out negotiations between the Primitiva Gas Company and the Municipal Council of Buenos Aires for a revision of the Company's contract that makes allowance for the revolutionary changes that have taken place in the manufacturing cost of gas. By its failure hitherto to allow the Company to compensate itself for the great advance in fuel, wages, and stores, and by acts of a non-passive character that placed other heavy burdens on the Company, the municipal authorities of Buenos Aires have been responsible for the wrecking of what was one of the most solidly prosperous concerns in South America. For some years (down to 1913) the Primitiva Gas Company paid regular dividends of 8 p.ct. on its ordinary shares. The position subsequently went from bad to worse. The last dividend on the £1,450,000 ordinary capital was 2½ p.ct. for 1914; while interest on the 2½ millions of 5 p.ct. cumulative preference shares has been in arrears since Dec. 31, 1915. The history of the revised contract that has just become operative dates back to the summer of last year, when Mr. A. E. Bowen, the Chairman of the Company, as the result of a visit to Argentina (in the course of which he had numerous interviews with the municipal authorities and the President of the republic), obtained a promise that the affairs of the Company should be redressed, and arranged a new contract *ad referendum* with the Municipal Council. The Company's claim against the Municipality for public lighting has already been settled by compromise; but it has taken from the end of July until the 10th of the present month for the new contract to go through—the Lord Mayor even reconsidering certain clauses after it was announced on Dec. 29 that the contract had been ratified and the Company had taken the very proper course of promptly informing its shareholders.

The main provision in the new contract is that it permits a sliding-scale of charges for gas; the basis being 19½ cents paper per cb.m. with coal at $7 to $8½ gold, and ½ cent paper increase or decrease on each $ gold in the cost of coal or substitutes. Further, while the calorific value of gas when coal is used is fixed at 4·500, it may fall to 3·500 when the Company is driven to using substitutes for coal. The contract, while fixing maximum hours and a minimum wage for employees on the same scale as has been adopted by the Municipality, provides that all future increases in wages and pensions, &c., shall be met by the Company charging half the increases to gas consumers and half to bye-products. Another clause that constituted an eleventh-hour amendment is to the effect that all fines relating to deficiency of calories shall be refunded to consumers by a decrease in the following month's bill, instead of being paid to the Municipality. It is the intention of the Chairman, as soon as the full details of the contract as promulgated reach this side by mail, to call the shareholders together and explain the position at length. Meanwhile, it is a matter of congratulation that Mr. Bowen's long struggle to obtain a measure of justice for the Company has at last been rewarded. In time, the Primitiva Gas Company will, it is to be hoped, get back to a state of financial comfort, though this must not be expected to occur immediately. In the meantime, the Board will have to tackle the question of refurnishing the Company with working capital and dealing with the accumulation of four years' interest arrears on the preference shares.

Lerwick Gas-Works Ownership.—The Lerwick Town Council are communicating with the Lerwick Gas Company in order to ascertain if they are willing to sell the gas undertaking to the town, and what terms would be asked.

REDCAR GAS PURCHASE SCHEME.

Meeting of Ratepayers.

At a meeting of ratepayers held at Redcar last Thursday, to confirm or otherwise the action of the Urban Council in endeavouring to acquire the local gas undertaking, the Council's scheme was declared carried. The show of hands though was a "near thing;" and a poll of the ratepayers was demanded.

Major J. S. CRONE (the Chairman of the Council), who presided, said it would be necessary to promote a Bill. Under the agreement, the Council would take over the Redcar, Coatham, Marske, and Saltburn Company's undertaking as from the end of June, 1919. The shareholders would receive 6 p.ct. dividend up to Aug. 16 or the date of the transfer fixed by Parliament, whichever was the earlier. If they could not get the property without the consent of the shareholders and Directors, he did not think there was any chance of acquiring the undertaking compulsorily. The Company supplied, in addition to Redcar, the urban district of Saltburn, and a very large rural district. The Council now had an opportunity of acquiring the undertaking on very satisfactory terms; and of that body, eleven members were in favour, and only one against. There was quite a possibility too of coke-oven gas being available in eighteen months or two years. Taking the balance-sheets over the past ten years, they showed clearly that the Company had been earning considerably more than was required to pay the dividend allowed by Parliament; and the surplus earnings had been expended upon improvements in the plant, increasing the cash reserves or the working capital, and to a small extent in reducing the mortgage debt. In that period, after paying mortgage interest, dividends on share capital, rates and taxes, bank charges, Directors' fees, and general management expenses, there was £59,000 available out of profits (or practically £6000 annually) for repairs and improvements to plant. Put in another way, the amount paid out in dividends and interest on mortgages was about £8000 less than was spent on the plant. In 1918, the last year for which they had a balance-sheet, after outgoings of every kind had been met, there was a surplus of £12,813 to spend on plant, or a sum equal to one-fifth of the share capital. In all, not less than £141,892 had been spent on the plant; and most of this was at pre-war prices. It was capable of producing 200 million c.ft. of gas; but the actual sales in 1918 were 138 millions.

Mr. ARTHUR VALON (who had valued the undertaking) gave a very favourable report on the plant. He had no doubt that it was an extremely opportune time to buy.

Mr. T. PHILLIPSON, who opposed the scheme, accused the Chairman of having gone behind the backs of the Council, and of having negotiated direct with the Company instead of through the Council's Clerk. He also criticized the appointment of a Valuer three months after the the Council had agreed to purchase. He was not surprised at the willingness to sell, when shares which could be bought at £10 last year were now to be valued at £19 under the Council's purchase. The Council were, he said, "fleecing the ratepayers to fill the pockets of wealthy gas-owners."

PRICE OF COKE.

In view of the uncertainty there has been respecting the effect on coke of the recent reduction of 10s. per ton of household coal, the advertisements which appeared in the "Deal, Walmer, and Sandwich Mercury" of Jan. 3 and 10 may be of interest to gas companies.

> The Household Fuel and Lighting Committee of the Borough of Deal, under the powers conferred on them by the Household Fuel and Lighting Order, 1919, hereby announce that, in consequence of the reduction of 10s. per ton on household coal (including bakeries, other than large steam machinery bakeries), dating from the 1st of December, 1919, the price of coke is reduced, on and after Saturday, the 3rd of January, 1920, as follows:
>
> | | | | | |
> |---|---|---|---|---|
> | Coke per ton | £1 | 16 | 4 | at the gas-works. |
> | „ chaldron | 1 | 1 | 9 | „ „ |
> | „ cwt. | 0 | 1 | 10 | „ „ |
> | „ bushel | 0 | 0 | 7½ | |
>
> T. C. Golder, Local Fuel Overseer.
>
> 23, Queen Street, Deal,
> Thursday, Jan. 1, 1920.

This was tantamount to a 10s. per ton reduction in the price of coke.

> The Local Fuel and Lighting Committee wish to give notice that the Board of Trade have now altered their decision as to the reduction in the price of coke, and have notified the fact to the Local Fuel Overseer by telephone, on Monday last, the 5th of January. Therefore, the altered prices of coke (advertised on the 3rd of January, 1920) are hereby withdrawn and cancelled. The Board of Trade's decision now is that the reduction in the price of coal shall be only taken off the price of gas, and not off the price of coke (with certain adjustments for coal, &c., not used for household purposes).
>
> T. C. Golder, Local Fuel Overseer.
>
> 23, Queen Street, Deal,
> Jan. 7, 1920.

This latter advertisement may form a useful precedent for any company who may be subjected to the threat of the coke price being reduced.

By instruction of the Directors of the Bognor Gas Light and Coke Company, Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., invite tenders for £8000 of 6½ p.ct. redeemable debenture stock, to be redeemed at par on Jan. 1, 1930. The minimum price of issue is par; and tenders must be received by the morning of the 30th inst.

RECEIPTS AND EXPENDITURE AT SHEFFIELD.

Figures from the Gas Company's Accounts.

In connection with the recent discussion as to the advisability of the Corporation seeking power to purchase the undertaking of the Sheffield Gas Company, several members of the City Council asked questions which required time and labour to reply to in detail. Some of the queries were answered last month [see "JOURNAL," Dec. 16, p. 612] by information compiled by Mr. A. T. Watson (the Gas Auditor); and replies to others have now been prepared.

In answer to a request for particulars, for each year from 1910 to 1919, as to the gross receipts per 1000 c.ft. of gas accounted for, and the gross expenditure per 1000 c.ft. of gas made (after deducting the receipts for coke and other residuals, and including leakage), the following table has been compiled:

Gas Sold (including Gas Used by Company).

Year.	Gas Sold.	Amount.	Return per 1000 C.Ft.
	Cubic Feet.		s. d.
1910	3,679,942,400	£227,146	1 2·81
1911	3,979,385,800	239,146	1 2·42
1912	4,223,354,000	241,225	1 1·71
1913	4,587,922,200	255,413	1 1·36
1914	4,679,982,500	257,549	1 1·21
1915	4,949,470,500	332,350	1 4·12
1916	5,343,994,400	414,152	1 6·60
1917	5,801,445,800	443,510	1 6·35
1918	5,207,727,760	574,286	2 2·47
1919, June half year	2,379,088,630	351,470	2 11·46

Gross Expenditure (after deducting Gross Receipts for Coke and Residuals, and including Leakage at Sale Price).

Year.	—	Per 1000 C.Ft of Gas Made.
		s. d.
1910	£179,869	0 11·32
1911	188,546	0 11·09
1912	189,916	0 10·48
1913	238,325	1 0·08
1914	254,256	1 0·44
1915	274,966	1 0·81
1916	362,318	1 3·63
1917	449,365	1 5·90
1918	548,903	2 0·53
1919, June half year	316,802	2 6·30

COAL AND BYE-PRODUCTS.

Lectures in a Popular Style.

The Efficiency Club for Business and Professional Women has for some of its objects to promote greater efficiency and co-operation, and to form a link between professional and business women for their mutual advantage; and among its other activities are a series of lectures, delivered in the Conference Hall at the Central Hall, Westminster. These are on divers subjects; and at some of them, business and professional men are welcomed. Such an occasion was last Thursday evening, when (with the Hon. Lady Parsons in the chair) there were two lectures to a large audience, in which matters connected with coal mining and carbonization were treated in a popular, but very informative manner.

First, Mr. Cyril E. Hodges, M.A., explained some cinematograph films (produced by the United States Bureau of Mines), illustrating the processes of anthracite coal mining and coal dredging. He said that, of the three main classes of coal—lignite, bituminous, and anthracite—the last-named possesses the highest quantity of pure carbon. This country is behind all others in using anthracite; and, to his mind, the sooner we copy more progressive people, the better it will be. In Pennsylvania, the area of the anthracite coal reserves is 500,000 square miles. There are now in Wales 80 collieries managed by fifty to sixty companies; and the anthracite extends to large areas under the sea.

It had been expected that Mr. W. G. Adam, B.A. (Chief Chemist to the Gas Light and Coke Company) would be present to give the second lecture—on the "Bye-Products of Coal-Gas Manufacture." But unfortunately he was indisposed, and his place was taken at short notice by Dr. E. W. Smith (Chief Chemist to the Birmingham Corporation Gas Department), who illustrated his remarks by some lantern slides. Mr. Adam, too, had sent up a number of excellent specimens of products from the Company's tar-works. In opening, Dr. Smith said Mr. Hodges had appealed to him for support in advocating the use of anthracite. He assumed that Mr. Hodges had in mind the burning of anthracite coal in the usual closed American grate, under restricted air conditions; and, if so, he could support him. He regarded it as being very much better than the use of bituminous coal; but after all it is merely a "half-way house" to still greater efficiency by the abolition of all solid fuel for household purposes, and the ultimate adoption of gas or electricity—depending altogether upon the pockets of the consumers. The gas industry and the nation are interested more particularly in other coals than anthracite. The coals that are most plentiful in this country are bituminous—that is, coals which, when heated out of contact with air in a chamber, will soften and get liquid, and will lose in the heating-up to about 33 p.ct. of their weight. Such coal, if it is sufficiently highly heated, loses practically the whole of its volatile matter. Similarly treated, anthracite loses

very little of its weight; and at the end it is found in identically the same form as when put into the heating chamber. Small or big, the result would be the same. If, however, small bituminous coal was put into the retort, it would run together and form a sticky mass, and finally be found in one cake of coke. The gas industry, on whose behalf he spoke, depends entirely on bituminous caking coals.

Proceeding, Dr. Smith pointed out that, with an ordinary coal-grate the heat that is available is only from 25 to 30 p.ct. of the total amount generated by the burning of the coal. This seemed to be a wholly unjustifiable waste of a national product; and, apart from this, there is the inconvenient and uncivilized method involved of bringing fuel through the streets. The anthracite stove is, of course, quite a different proposition; and, without having seen actual figures, he imagined the efficiency would be somewhere between 60 and 70 p.ct. It ought to be possible to obtain such an efficiency. Anthracite, however, so far as this country is concerned, is procurable only from Wales in anything like large quantities; and it is not likely that its use will become general outside London and a few other places.

As to the British gas industry, said Dr. Smith, it is very many years in front of any other country in the world, from the point of view of national advancement in gas engineering. "I should like," he went on, "this to be a little consolation for pessimists who believe nothing good can come from this country. The gas industry in this country leads the world; that goes without challenge, and there is no fear of it being challenged. Germany is a long way behind the work we are doing, and have been doing for a great many years in this country, taking the gas industry as a whole. We have had it rubbed into us that Germany has done this, that, and the other. In dyes she has, and she has done well. But dyes are just one small part of the gas industry, and, as a matter of fact, have nothing whatever to do with the actual operations of the industry, which merely supplies the raw materials from which dyes can be made. Even in the dye industry, we are improving as a nation.

Dr. Smith then briefly explained to his audience what goes on in a big gas-works, and enumerated the various products, upon which substances, he declared (explaining their uses), the English chemical industry practically depends. The dyes are a key industry, sulphuric acid is a key industry, and every one of the products obtained from coal is of national importance. He went on to read some figures which he had himself compiled, showing that from every ton of coal there can be obtained about 12,000 c.ft. of good gas, as well as 13·72 cwt. of coke, 10·25 gallons of tar, and some 30 gallons of liquor. If these products were evaluated for last year at the market prices, the result would be something like this: The gas if sold at about 3s. per 1000 c.ft., would be worth 37s. 5d. per ton of coal; the coke, about 14s. 6d.; the tar, nearly 2s.; the liquor, 2s. 6d.; and another bye-product he had not so far mentioned, cyanide, nearly 8½d. So that they would have been getting back 57s. from coal which might at the time he was referring to have been worth 26s. per ton. But many gas undertakings are municipally owned, and work to make no (or relatively little) profit on their capital. Consequently all the difference between 26s. and 57s. can be taken as the cost of running a particular gas undertaking.

The importance of cyanide was emphasized; the lecturer remarking that at the present time there cannot be said to be a reasonable proportion of gas undertakings washing cyanide out of their gas. The amount of cyanide in coal gas is, he said, so exceptionally small that, as an impurity, it is of negligible account to those people who do not take it out. In Birmingham, it is regarded as a handsomely paying proposition to remove the cyanide. Cyanide washing on all the works in Birmingham would be worth at least £12,000 a year in profit; so that it should be taken out, if only for monetary reasons. Again, in pre-war days very few gas undertakings in the country washed their gas for benzol. Now, a large number are making motor spirit; anything between 1 and 2 gallons of spirit being obtained from every ton of coal. This is of national importance. There should be a demand made for the use of more benzol, in which case there is no doubt that many more undertakings will wash their gas for it.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 19.

All tar products in the London area are in a strong position, with a tendency to rise in value. Pitch is well over 90s. net per ton f.o.b. makers' works; while it is reported that business has been done in creosote at 9d. per gallon net in bulk. Crude carbolic acid, 60's, has materially improved, and the present price is about 3s. 6d. net per gallon, packages extra. Solvent naphtha, pure toluol, and pure benzol are unchanged.

The following items are taken from the official returns of exports for the year 1919:—

Benzol and toluol	980,828 gallons.
Carbolic acid	134,266 cwt.
Naphtha.	569,011 gallons.
Pitch	13,025,739 cwt.
Tar oil, creosote, &c. . . .	13,699,909 gallons.
Sulphate of ammonia . . .	94,435 tons.

A comparison with figures for recent years would be, of course, of little service.

There is no alteration in the prices of sulphate of ammonia for home agriculture, although the figure is still some 40 p.ct. below its market value for export.

Tar Products in the Provinces.

Jan. 19.

The average values for gas-works products during the week were: Gas-works coal tar, 56s. 9d. to 61s. 9d. Pitch, East Coast, 97s. 6d. to

THE FIRE OF THE SEASON

WHEN, besides economy, efficiency, and hygiene—the fundamental virtues of the modern Main Gas Fires—there has also to be considered the desirability of securing unity and harmony in the relation of the Gas Fire with any particular coal grate surround, the "ENTENTE" Fire meets the case. This fire is designed to register accurately with any modern interior and to harmonise with the most artistic Mantel Register. The illustration shows the "ENTENTE" fitted in a modern interior.

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102s. 6d. per ton f.a.s.; West Coast—Manchester, 85s. to 90s.; Liverpool, 85s. to 90s.; Clyde, 97s. 6d. to 102s. 6d. nominal. Benzol 90 p.ct., North, 1s. 11d. to 2s..; crude 65 p.ct. at 120° C., 1s. 2d. to 1s. 3d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 10d. to 2s. Toluol, naked, North, 2s. 1d. to 2s. 2d. nominal. Coal tar crude naphtha in bulk, North, 9½d. to 10d. Solvent naphtha, naked, North, 3s. 1d. to 3s. 3d. Heavy naphtha, North, 2s. 7d. to 2s. 9d. Creosote, in bulk, North, liquid, 7d. to 7½d.; salty, 6¾d. to 7d. Heavy oils, in bulk, North, 7½d. to 7¾d. Carbolic acid, 60 p.ct., 3s. 3d. to 3s. 6d. Naphthalene, £18 to £22; salts, £6 10s. to £7 10s., bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Although a firm tone is fairly general, some irregularity prevails, particularly in Provincial centres. Pitch remains very strong. Dealings are reported from the North at 95s.; while as much as 105s. has been paid in South Wales. The demand from the Continent is very strong, and the end of the movement is not yet, although uneasiness is apparent in some quarters. There is no actual change is the condition of carbolic acid. A rumour, however, is going around that the Government are about to prohibit exports; and this has held-up business for the moment, since it is not stated whether the export of the large quantity of old Government stock bought by Japan is affected or not. Creosote is in exceptional demand, which far exceeds the supply, and up to 7¾d. is now mentioned in the Provinces. It is rumoured that, in view of the business in benzol which has followed the successful test as a motor spirit by the National Association, the petrol people are pressing for the taking-off or reduction of the duty on that spirit; but benzol prices do not seem to be affected as yet. Naphthalenes are firm, more particularly the crude salts; and naphthas are steady. The market in intermediates is still very difficult, and makers are practically fully sold for most products. Export licences are still withheld; and it is hoped that this will enable makers to overcome the difficulty. Aniline oil is firm, and in very short supply. Salts are almost unobtainable before April or May delivery. Salicylic acid has advanced further; and makers are sold-up for the next few months.

Latest quotations are as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 10½d. North; crude, 60-65% 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 50s. to 55s.; Midlands, 50s.; North, 50s. per ton *ex* works. Refined tar, 32s. 6d. per barrel (free) on rail.

Pitch: London, 95s. per ton; East Coast, 87s. to 95s. per ton; West Coast, 90s. to 92s. 6d., with Manchester 90s. per ton, and Glasgow 92s. 6d. per ton; South Wales, 105s. per ton.

Solvent Naphtha: London, 3s. 3d. Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 9d.; North, 8½d. per gallon.

Heavy Naphtha: 2s. 6d. per gallon.

Naphthalene: Refined, £23 per ton nominal; crude, £8 to £11, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 7¾d.; North, 7½d. to 7¾d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 7d. to 1s. 8d. per lb., drums free.

Cresylic Acid: 95%, 3s. to 3s. 3d.; 97-99%, 3s. 3d. to 3s. 6d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. per gallon; crystals 40%, 1s. to 1s. 2d. per lb.

Sulphate of Ammonia.

Exports of this material improved perceptibly during December; and over 14,000 tons were sent away. The total exports for the year amounted to 94,435 tons, compared with 19,150 tons in 1918 and 62,931 tons in 1917. A very gratifying feature of this increase is that trade with Japan, our largest pre-war customer, is improving again. Close on 40,000 tons were sent there last year. Then came France, with some 17,000 tons, followed by the Dutch East Indies, 13,000 tons; Spain and the Canaries, 5600 tons; British West Indies, 3350 tons; and Italy, 2760 tons. The new year has opened quite well. Although outputs in many cases are on the increase, the makes are being rapidly snapped-up; and the demand is such that there does not seem any chance of stocks being accumulated for some time to come. During the past week, the long-awaited report of the Nitrogen Products Committee was made available; but, on the whole, it is a disappointing affair. Far more interesting and to the point is the announcement that the rights for the United Kingdom and the Colonies of a new French synthetic ammonia process, developed by M. Georges Claude, have been acquired by a powerful group, who are to erect works and plant in West Cumberland. The first unit of this plant is to be sufficient to provide some 50,000 tons per annum of sulphate of ammonia.

Imprisonment for Gas Theft.—At the Leicestershire Quarter Sessions, William K. Spreckley, a motor engineer, pleaded guilty to stealing a quantity of gas from the Kegworth Gas Company, and was sentenced to two months' imprisonment in the second division. It was discovered that prisoner was running a 10 H.P. gas-engine. The meter was disconnected; the gas for the engine being taken direct from the main. When the police removed the connecting-pipe from the main, the engine stopped. The defence was that the meter had been only disconnected three times altogether.

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Patent No. 123873.

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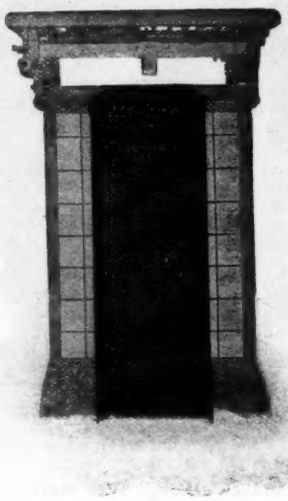

Back View of Flue.

The "Economic" Flue, when placed on outlet nozzle of a gas cooker or boiler, directs the products downwards, which travelling slowly owing to increased size of the pipe, are so cooled that they remain near the floor level and are dissipated.

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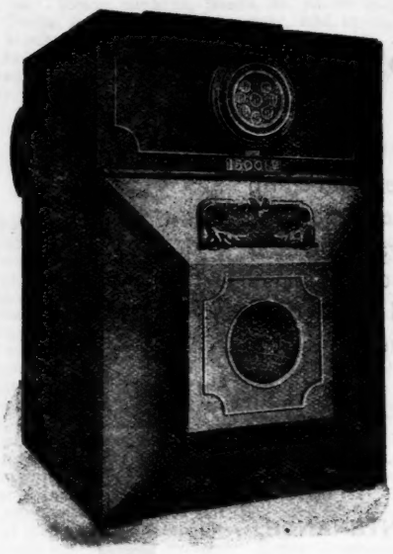

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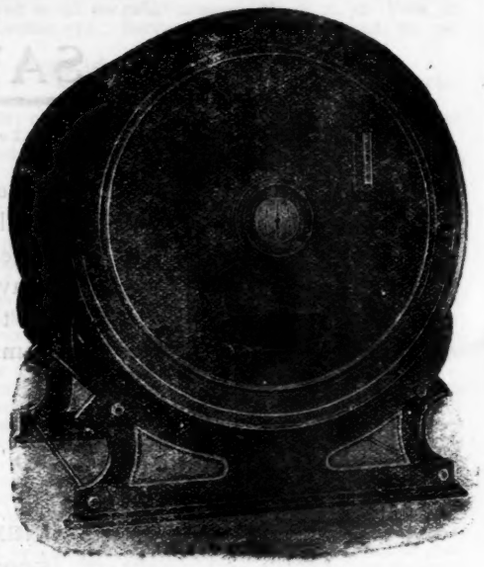

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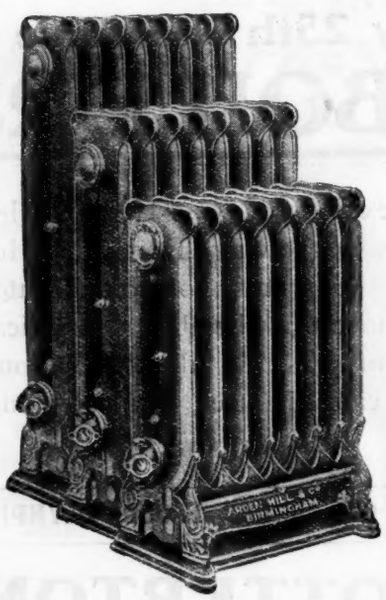

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A Manchester Chemical Trade Review.

Reviewing the chemical trade of the past year, Messrs. Sir S. W. Royse & Co., Ltd., of Manchester, say that, in the matter of tar products, the demand during the year was only a moderate one; but there was more activity during the last few months, and some good business has been placed for forward delivery. The recent strikes much interfered with manufacture and delivery. Refined benzols continued firm; and the production was readily absorbed—especially for motor purposes. The National Benzol Association was formed during the course of the year for the purpose of regulating and distributing supplies for the motor trade. Crude benzol was in good demand; and parcels were taken up readily at full prices. Some heavy sales have been made over 1920 at increased figures. Toluols continued steady, and latterly have been slightly firmer. During the earlier part of the year solvent naphtha was somewhat depressed; and the price for 90/160 fell from 3s. per gallon in January to 2s. per gallon in August, since when, owing to shortage of raw material, the market has steadily improved. Inquiries are plentiful, and stocks small; and much better figures are being obtained. Crude carbolic acid was in an almost lifeless condition during most of the year; and prices fell from about 3s. 8½d. per gallon at the end of 1918 to nominally 1s. per gallon six months later. There has latterly been more demand; and prices are reaching figures at which makers are finding it worth while to produce. Crystal carbolic acid has been dull until recently, when a strong export inquiry improved the position. Stocks are cleared, and the market closed firm. Liquid carbolic acid ruled steady all the year. Creosote was fairly firm during the year, but is now much stronger, owing mainly to the large quantities going into consumption for liquid fuel. Pitch has advanced steadily, and is in a strong position. Inquiries are numerous both for home and export markets—the former especially having been keen buyers during the last few months—and some big business has been effected over 1920 at good figures. Naphthalene was quiet in the early part of the year, with falling prices; but latterly important business has been done at increasing figures. In sulphate of ammonia the home market has been taking the bulk of the production, and exports have increased; the returns showing 79,972 tons, value £1,937,052, for the eleven months ended November, as against 17,873 tons, value £457,131, for the same period of 1918.

Thornaby Corporation and Stockton Gas.—Mr. Spens, at a meeting of the Thornaby-on-Tees Corporation last Tuesday, said he thought they ought to take up with the Stockton Corporation the matter of the unsatisfactory gas supply. They should complain about the "shocking stuff" that they were getting. Mr. Shepherd remarked that he was sure they could get a better supply themselves from the coke-ovens. It was decided to communicate with the Stockton Corporation on the matter; and Mr. Oxberry gave notice that he would raise the question at the next meeting of the Council.

Coal Shortage at Coventry.—The shortage of coal at Coventry is causing much anxiety; and at the gas-works the stocks in hand will only last two weeks. Unless there is in the meantime an increase in the delivery, the Committee will be compelled to restrict the supply of gas.

Double Gas-Poisoning Fatality in London.—There was an inquest at Marylebone last Tuesday on the bodies of William Dunley and his brother-in-law, George Sanford, who were found dead at their flat in Bell Street, Edgware Road. They were found in bed dead, with the room full of gas, which was escaping from a jet just over the head of the bed. It was their custom to keep the gas alight at night. A police-sergeant said he found nothing to suggest suicide. The door was partly open, and the window was an ill-fitting one. He was of opinion that in the gale the draught from the window had blown out the flame of the gas-jet. The verdict was "Death from misadventure."

Price of Gas at Middlesbrough.—With reference to a decision to raise the price of gas at Middlesbrough by 4d., to 2s. 4d. per 1000 c.ft. Alderman Calvert (the Chairman of the Committee) said, at a meeting of the Corporation last Tuesday, that the reason was because the cost of production had increased. The cost of labour had more than doubled, and rates and taxes had gone up likewise; while the consumption of gas in the town had now gone far beyond the limits of the coke oven supply, so that whatever was required over this could not be manufactured any more cheaply than by their neighbours, who were charging nearly twice the amount of Middlesbrough. The Corporation were now paying more for coke-oven gas. During the whole of the war the people of Middlesbrough were charged practically the lowest price in the whole country for gas. It was so still. Mr. F. Carey asked as to the transactions which Alderman Calvert has had with the firm responsible for the supply of coke-oven gas; but the Mayor said that if Mr. Carey sought the information privately from Alderman Calvert, he would have cause for satisfaction.

Nottingham's Reduced Prices.—The Nottingham Gas Committee have determined to reduce forthwith the price of gas by 8d. per 1000 c.ft., as a result of the 10s. per ton being taken off the charge for domestic coal. During the current quarter the difference will be allowed in the form of a rebate. The previous adjustment of the charges made locally came into operation from the date of the reading of the meters for the Michaelmas quarter, 1918, the scale then adopted being: For lighting and general purposes supplied through ordinary meters, 3s. 4d., 3s. 5d., and 3s. 6d. per 1000 c.ft., according to consumption; for power purposes, 2s. 8d. to 2s. 11d.; for "gassing" in the lace industry, 3s.; and for gas supplied through prepayment meters, 4s. 2d. The reduction now to take effect will apply, it is understood, to all consumption for domestic purposes; and the action of the Committee has occasioned great satisfaction—particularly in view of the fact that the diminished charges have been decided upon at a period when a further heavy addition to the labour bill will have to be met, consequent upon the decision of the Industrial Court.

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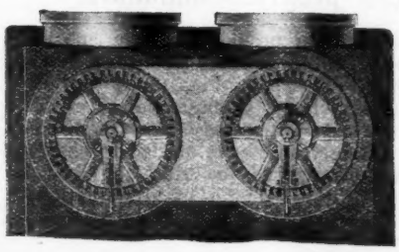

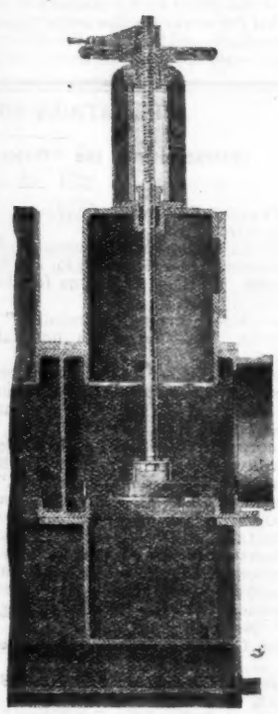

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Power Facilities of Sheffield.

As one of the "Sheffield Series," there has been issued an illustrated booklet, by the Development Committee of the Sheffield City Council, descriptive of the power facilities of this industrial centre. It is short and to the point, well got up, and written in a style likely to appeal to the reader. Thus it should assist in the object with which the series is being prepared—that is, to create and stimulate interest in the city. The importance of a plentiful supply of power at the lowest marketable rate, should need no emphasizing; and Sheffield possesses facilities which entitle it to the greatest consideration in this respect. For those who desire electricity, there is a municipal undertaking, the plant at which, when the new station and other schemes which have been arranged are completed, will be equal to providing an output of over 630 million units per annum. In the rapid development of gas and oil engines, it is remarked, Sheffield is greatly interested, and looks forward to being able to utilize all the discoveries of present-day scientific men, with advantage to the manufacturing industries of the district. In the case of the steam-engine, it is known that the loss of 80 p.ct. of the heat supplied to it is irrecoverable; whereas the losses in gas and oil engines (which vary from 60 to 75 p.ct.) are capable of reduction and, to a great extent, of recovery. Sheffield's advantages in the matters of coal supply and gas supply are pointed out; and it is said that in securing a supply of coal for gas-making purposes, no city is so well situated as is Sheffield. In 1917, the Sheffield Gas Company sold 5,841,445,000 c.ft. of gas—909,000,000 c.ft. being for power. The price of this gas is much higher than in pre-war days, though even now comparatively lower than elsewhere, thus providing exceptional facilities for cheap supplies of power through the medium of the modern gas-engine, which is simpler, more reliable, and more economical than ever. There are specially reduced rates for the supply of gas for engines; and the Sheffield Gas Company employ their own technically qualified specialists to advise intending consumers as to what is best in the alteration of existing plant or in the installing of new plant. They provide specifications and superintend the erection and testing of the engines. In fact, in every way the manufacturer whose location is Sheffield is confident of a cheap and reliable source of power in the gas-engine. The Gas Company have made unique provision for demonstrating the use of gas as an industrial heat agent. In whatever direction gas may be used, the consumer has the satisfaction of knowing that he has the benefit of the services of scientifically trained experts, who inspect periodically all plant, to make sure there is no waste.

Price of Gas Reduced at Burton.—At a meeting of the Burton-on-Trent Town Council, last week, it was announced that, in consequence of the reduction in the price of coal, the charge for gas would be reduced by 9d. per 1000 c.ft. At the same meeting, it was decided to increase the salaries of the higher officials of the Corporation, one of whom—Mr. W. Wilson, the Gas Manager—received an advance of £100, bringing his remuneration up to £650.

Port Glasgow Gas Supply.—The Port Glasgow Town Council have had under consideration an offer from the Greeenock Town Council to supply Port Glasgow with gas for the whole burgh. The Port Glasgow Council have replied that steps were taken to promote a Provisional Order for the erection of new gas-works at Port Glasgow, and that the works are now under construction. The necessary money has been borrowed for the undertaking; and the Town Council cannot now entertain any proposal from Greenock.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Jan. 14.]

Nos. 268—915.

ACETYLENE EQUIPMENT COMPANY.—"Gas-pressure regulators or reducing valves." No. 591.
ALLDAYS & ONIONS.—"Gaseous and liquid fuel burners. No. 406.
ANDERSON, D.—"Radiants for gas-fires." No. 757.
BARBER, E. E.—"Apparatus for drying and filtering illuminating gases." No. 747.
BERG, M.—"Inverted gas-mantles." No. 523.
BOISELL, W.—"Adaptable hot-plate and oven for gas-stoves." No. 846.
BURTON, A. E.—"Apparatus for carburetting air to form gaseous fuel for internal-combustion engines and turbines." No. 770.
COLONA, G. C.—"Method of generating gas for internal-combustion engines." No. 414.
CROWTHER, W.—"Spent oxide burner." No. 728.
DOWNEY, E. L.—"Increasing durability of inverted incandescent gas-mantle, and securing it in position." No. 784.
HIBBERD, C. E.—"Coin-freed mechanism." No. 333.
MEADE, A.—"Distillation of coal, &c." No. 288.
NICHOLSON, A.—"Gaseous and liquid fuel burners." No. 406.
PARKINSON, B. R.—"Automatic valves of geysers." No. 439.
PEARSON, J.—"Adjustable stop for stop-cocks." No. 639.
PEARSON, J.—"Adjustable stop for stop-valves." No. 898.
ROBINSON, F. H.—"Retort-setting for complete gasification of coal." No. 536.
SKIPP, G.—"Mantle-bar grid for gas hot-plates and stoves." No. 734.
SMITH, H. C.—See Meade. No. 288.
SNELL, C. SCOTT-.—See Anderson. No. 757.
STEPHENS, J. E.—"Gas fire-lighter." No. 319.
STEPHENSON, G. J.—See Acetylene. No. 591.
THOMPSON, C. T.—See Boisell. No. 846.
YORKE, F. G.—"Incandescent gas-burners, &c." No. 631.

Licence Granted by the Public Trustee.

Nos. 12,117 of 1912 and 17,690 and 18,942 of 1913. Applicant for patent; MESSERSCHMITT, A. Licence granted to SAMUEL CUTLER & SONS, LTD.

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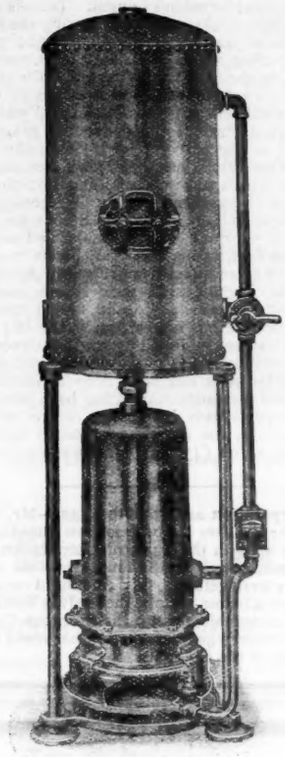

The "Ironclad" complete with Thermostat, swing-out burner and cylinder with "cut-out" valve.

This combination hot water circulator and storage cylinder is ideal for new houses or in cases where no hot water system is already installed. As a labour-saving device that is efficient, reliable, and practically indestructible, its many special features at once appeal to Architects, Builders, and all interested in the new standard of comfort which modern progress demands.

The cylinder is provided with a special "cut-out" valve which virtually reduces its capacity to five gallons (or any other quantity stipulated) when moderate quantities of hot water only are required. When a larger supply is needed for bath, the valve is opened to bring the whole contents of the cylinder into circulation.

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Dublin Gas Employees' Strike Threat.—A strike of the Alliance and Dublin Consumers' Gas Company's workers on wages questions was threatened last week, but was postponed pending a conference which is expected to be held within a day or two. It is stated that the Industrial Court's award on gas-workers' claims does not apply to Dublin. An offer made by the Company was rejected by the men.

Traders and Coppers in Gas-Meters.—Retail traders in the West Riding of York are acutely short of copper coins, and are pestering the gas departments for the coppers from meters. At Huddersfield, last week, the matter was brought before the local Chamber of Trade, who decided to ask officially for more frequent collections from gas-meters, that the practice of Corporation employees disposing of copper be discontinued, and that all the coppers from the gas and tramway departments should be paid into the local bankers' clearing-house, so that it could be distributed fairly. It was also decided to ask the National Chamber of Trade to advocate that the practice of using copper in gas-meters should be made illegal, and that suitable discs should be provided by gas authorities, in order to release copper coins for "legitimate" uses.

Acetylene Generator Fatality at Enfield.—The explosion of a home-made acetylene generator was attended by fatal results to an Enfield working man. The apparatus had been made from two sheet-iron white lead drums. At the inquest, a verdict of "Death by misadventure" was returned.

Featherstone Council and the Gas Supply.—The quality of gas supplied by the Ackworth, Featherstone, and Purston Gas Company has again been discussed by the Featherstone Urban Council. Mr. Murphy proposed that the Yorkshire Electric Power Company be asked to utilize the powers granted them several years ago, with a view to supplying the Featherstone district with electric light. He said the gas supplied locally was most unsatisfactory, and numerous complaints had been made. Mr. J. Maxwell (a Director of the Company) said the quality of the gas was better than that supplied to Wakefield, Pontefract, or Castleford. His Company were doing their utmost to remedy any grievances. Mr. Evans thought it was time the gas question was considered seriously. Mr. Garrity also said it was high time the Yorkshire Electric Power Company should be asked to use their full powers in the district. The proposition was carried.

STOCK MARKET REPORT.

THE predominant tendency on the Stock Exchange did not improve last week. Things seemed unsettled generally; and the tone was fitful and variable all through. At the close, Bolshevist successful advances were prominently in view; and the tardy recognition by the Allied Powers that "something must be done" did not afford any plenary comfort whatever.

The gilt-edged market, naturally, was not strong. Home Government issues oscillated up and down; the last figures showing a fall, though a small one—viz., Consols 51¼-5⅛, War Loan 91⅜-91$\frac{13}{16}$, Funding 75-75¾, Victory 81⅛-81⅜. Indians were down; but Colonial new issues were firm. Home Rails were very shifty, but cheered up on news of a settlement of the Labour Question. Canadian were only moderate, and Argentine, after a move up, failed to hold it firmly.

The Foreign Market was very dull, with scarcely a point of light in it. French, Portuguese, Brazilian, Mexican, and Chinese were all flat.

In the Miscellaneous Market, there was a considerable amount of speculative activity.

Business in the Gas Market was quite active, and the prices at which issues of all descriptions changed hands indicated marked firmness. Apart from *ex div.* adjustments, only two quotations were varied. Most prominently in view was Imperial Continental, which rose steadily from 145 to 148, with an advance of 5 in the quotation. Primitiva of Buenos Ayres was regaled with further news of an early settlement with the City Council; but closing prices on Friday did not respond.

Bargains done for cash during the week were as follows: On Monday, Bombay 5⅛, British 25½, Gas Light ordinary 57, 57⅛, 57⅜, 57⅝, ditto preference 65, ditto debenture 50, 50¼, 50⅜, 51, Imperial Continental 145, 146, 146½, 147, 147½, 148, Monte Video 75, Primitiva 38s. 9d., 40s. 7½d., ditto preference 73s. 9d., South Metropolitan 57⅛, South Suburban 68⅛, Tottenham "B" 52½. On Tuesday, Bournemouth "B" 10$\frac{7}{16}$, 10$\frac{9}{16}$, Commercial 4 p.ct. 56½, ditto debenture 49½, Gas Light preference 65, 65¼, ditto debenture 50⅛, 50$\frac{3}{4}$, 51, 51½, Imperial Continental 145, 146, 146¼, 147, 148, Oriental 103, Primitiva 40s., ditto preference 70s., 71s. 3d., South Metropolitan 57⅛, 57½, Bournemouth 3 p.ct. debenture 50. On Wednesday, Gas Light ordinary 57, 57¼, 57⅜, 58, ditto debenture 51⅛, Imperial Continental 146½, 147, 147⅛, 148, Maidstone 56, Monte Video 72, Primitiva 40s., 41s. 3d., ditto preference 70s., 71s. 6d., 71s. 10½d., 72s., 72s. 6d., South Metropolitan 57⅜, 57½. On Thursday, Alliance and Dublin 44⅜, Gas Light ordinary 57, 57⅛, 57¼, 57⅜, 57⅞, 58, ditto preference 64½, Imperial Continental 146, 146¼, 147⅛, 147⅜, 147¾, 148, Maidstone 56, Primitiva preference, 70s., 70s. 7½d., San Paulo debenture 39½, South Metropolitan 57⅓, ditto debenture 50. On Friday, British debenture 61⅛, Continental Union 29½, European 10⅛, 10⅜, Gas Light ordinary 57, 57⅛, 57½, ditto debenture 51⅛, Imperial Continental 146, 146½, 147, 147⅛, Primitiva 38s. 9d., ditto preference 70s., South Metropolitan 57, 58, ditto preference 93½.

In the Money Market, there was a steady demand; but ample supplies averted any approach to tightness. Rates for discount ruled firm, but trade relaxed somewhat before the close. The Bank rate is 6 p.ct., as fixed on Nov. 6, 1919.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When ex-Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices, July 28, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,551,868	"	Sept. 26	5½	2¾%	Alliance & Dublin Ord.	39—44	43—48	44⅜
874,000	"	Jan. 15	4	4%	Do. 4 p.c. Deb.	76—79	61—63*	..
280,000	5	Oct. 30	7½	8%	Bombay, Ltd.	5⅛—5¼	5—5¼	5¼
60,000	10	Aug. 28	16	12%		20—30	19—20	..
888,110	10	"	7	7%	Bournemouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	15—15½	10—11	$10\frac{7}{16}$—$10\frac{9}{16}$
115,000	10	"	6	6%		13½—14	9½—93	..
159,740	—	Dec. 30	—	4%		..	64—66	..
999,045	Stk.	July 11	14	87/-	Brentford A Consolid.	261—266	56—61	..
784,930	"	"	11	31/8	Do. B New	204—209	52—57	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	76—78	..
221,400	"	Dec. 11	4	4%	Do. 4 p.c. Deb.	91—98	64—66	..
214,775	"	Sept. 11	11	7½%	Brighton & Hove Orig.	203—213	128—128	..
244,300	"	"	8	6½%	Do. A Ord. Stk.	154—159	84—89	..
988,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Sept. 26	12½	10%	British	44—45	25—27	26½
190,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	61—63	61⅛
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	47—50	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	6⅜—7½	..
150,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—6	6—9	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	68—68	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,519,280	"	Aug. 14	5/0/4	33/4	Commercial 4 p.c. Stk.	106—108	56—61	56⅜
560,000	"	"	5½	26/8	Do. 3½ p.c. do.	102—105	51—56	..
475,000	"	Dec. 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	49—51	49½
200,000	"	"	4	—	Continental Union Ltd.	70—72	30—35	29½
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	40—60	..
51,500	Stk.	Aug. 28	14½	12%	Croydon A 10 p.c.	..	135—145	..
218,408	—	"	11½	9%	Croydon B and C 7 p.c.	..	95—105	..
491,979	Stk.	—	6	5⅛%	Derby Con. Stk.	126—135	..	..
56,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,009,180	10	July 30	10	5/-	European, Ltd.	17½—18	10—11	10½—10⅝
16,998,976	Stk.	"	4/17/4	50/-	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 5 p.c. Con. Deb. 10 p.c. Bonds	98—102	55—59	57—58
2,600,000	"	"	3½	26/8		76—79	44—46	..
4,063,235	"	"	4	4%		96—99	64—67	64⅜—65½
4,674,850	"	Dec. 11	8	8%		72½—74½	50—53	50—51½
180,000	"	"	10	10%		..	..	..
82,500	"	Sept. 11	5	4½%	Hastings & St. L. 5 p.c.	..	57—62	..
268,740	"	"	3½	3⅛%	Do. 3½ p.c	37—39	40—45	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16⅝	8½—9½	..
56,603	Stk.	Aug. 28	9	8½%	Hornsey 7 p.c.	..	90—95	..
121,000	"	Sept. 11	7⅛	6⅜%	Ilford A and C.	151—154	88—92	..
65,780	"	"	6⅜	4¾%	Do. B	115—118	67—72	..
65,500	"	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	53—43	..
4,040,000	"	May 14	9	4½%	Imperial Continental	156—160	145—150	145—148
1,935,000	"	Aug. 14	8½	3⅜%	Do. 5½ p.c. Deb. Red.	84—86	85—90	..
235,245	"	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	86—91	..
2,498,268	"	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A B	211—218 146—148	..	..
806,068	"	June 26	6	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,788	"	Aug. 14	7/5/6	33⅜%	Maidstone 5 p.c.	..	56—61	56
15,000	5	June 11	6	8%	Malta & Mediterranean	4¼—4½	1⅞—2½	..
250,000	100	Oct. 1	6¼	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97	..
841,920	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	11½—12	72—77	72—75
1,575,393	"	July 30	4½	3⅜%	Newcastle&Gatsh'dCon.	96½—99½	66—67	..
532,708	"	Dec. 30	8½	8½%	Do. 5½ p.c. Deb.	85—88	55½—56½	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	..	13½—13⅝	..
55,940	10	"	7/14/0	7%	" " 7 p.c.	14—15	9—9⅜	..
800,000	Stk.	Nov. 27	8	8%	Oriental, Ltd.	117—122	102—105	103
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	4⅜—5½	..
60,000	50	Aug. 28	18	7½%	Portsea, Island B	124—131	60—65	..
100,000	50	"	12	6½%	Do. C	118—121	64—67	..
249,980	5	April 29	8	—	Primitiva Ord.	6¼—6	1⅜—2½	38/9—41/8
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅜—5	2¾—4	70/—73/9
221,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—98	70—72	..
600,000	Stk.	July 30	4	4%	Do. " " 1911	..	49—59	..
846,198	"	Dec. 30	4	4%	River Plate 4 p.c. Deb.	56—57	47—50	..
150,000	10	Sept. 26	6	6%	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½—11 4½—49	7⅛—8 39—41	39½
125,000	50	Dec. 30	5	5%	Sheffield A	228—234	75—80	..
135,000	Stk.	Aug. 28	10	6%	Do. B	223—234	75—80	..
209,984	"	"	10	6%	Do. C	220—223	75—80	..
533,500	"	"	10	4½%	Shrewsbury 5 p.c.	..	..	..
133,201	Stk.	Sept. 12	4	4%	South African	10½—11½	12—13	..
90,000	10	Oct. 15	9	10%	South Met. 4 p.c. Ord.	111—116	56—59	57½—58
5,609,895	Stk.	Aug. 14	5/4/0	50/-	Do. Pref.	..	93—95*	93½
250,000	"	Jan. 15	—	5%	Do. 3 p.c. Deb.	..	60—62*	60
1,895,445	"	"	8	8%	South Shields Con. Stk.	74½—74½	50—52*	..
224,820	"	Aug. 14	8½	5%	S'th Suburb'n Ord. 5 p.c.	157—159	105—107	..
959,795	"	"	6	3⅞%	Do. 5 p.c. Deb. Stk.	114—116	68—78	68½
187,558	Stk.	Dec. 30	5	5%	Southampton Ord.	116—118	78—88	..
647,740	"	Nov. 13	7½	3⅞%	Do. 4 p.c. Deb. Stk.	99—102	61—63	..
121,275	"	Dec. 30	4	4%		..	61—63	..
120,000	"	Aug. 14	—	4½%	Tottenham District { A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	70—75	..
789,275	"	"	6	3⅝%		115—117	50—55	52½
181,255	"	Dec. 11	4	4%		87—89	63—65	..
123,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
936,476	Stk.	Sept. 26	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	74—76	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	"	Aug. 28	8½	55/-	Wandsworth A 5 p.c.	151—156	85—90	..
955,686	"	"	6¼	40/-	Do. B 3½ p.c.	129—134	63—68	..
108,075	"	"	—	38/6	Do. C	..	63—68	..
140,865	"	"	—	38/6	New Ordinary	..	63—68	..
859,000	"	"	6⅜	33/9	Wimbledon 5 p.c.	117—122	65—70	..
98,000	"	"	6¾	40/-	Epsom 5 p.c.	131—136	65—70	..
[illegible]		Dec. 30	[illegible]	38/	[illegible] Deb. Stk.	68—69	48—50	..

* Ex Div.

The Middlesbrough Corporation are to invite tenders for the installation at the gas-works of a carburetted water-gas plant, with a capacity of 1½ million c.ft. of gas a day, and the necessary extensions to the plant-house. The approximate cost is estimated by the Gas Manager (Mr. C. F. Blincoe) at £17,000, made up of £13,000 for the plant, £3500 for the plant-house, and £500 for foundations, new connections, &c.

It is reported that on Monday of last week there was an unusual incident at a meeting of the Dalton-in-Furness Gas Committee. Several letters have recently appeared in the local Press from Mr. John Tyson, the Clerk to the Urban District Council, complaining of the gas supply. On the day named, a letter from Mr. Tyson was ordered to be burned, and the members of the Committee stood up while the Secretary carried out the cremation.

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